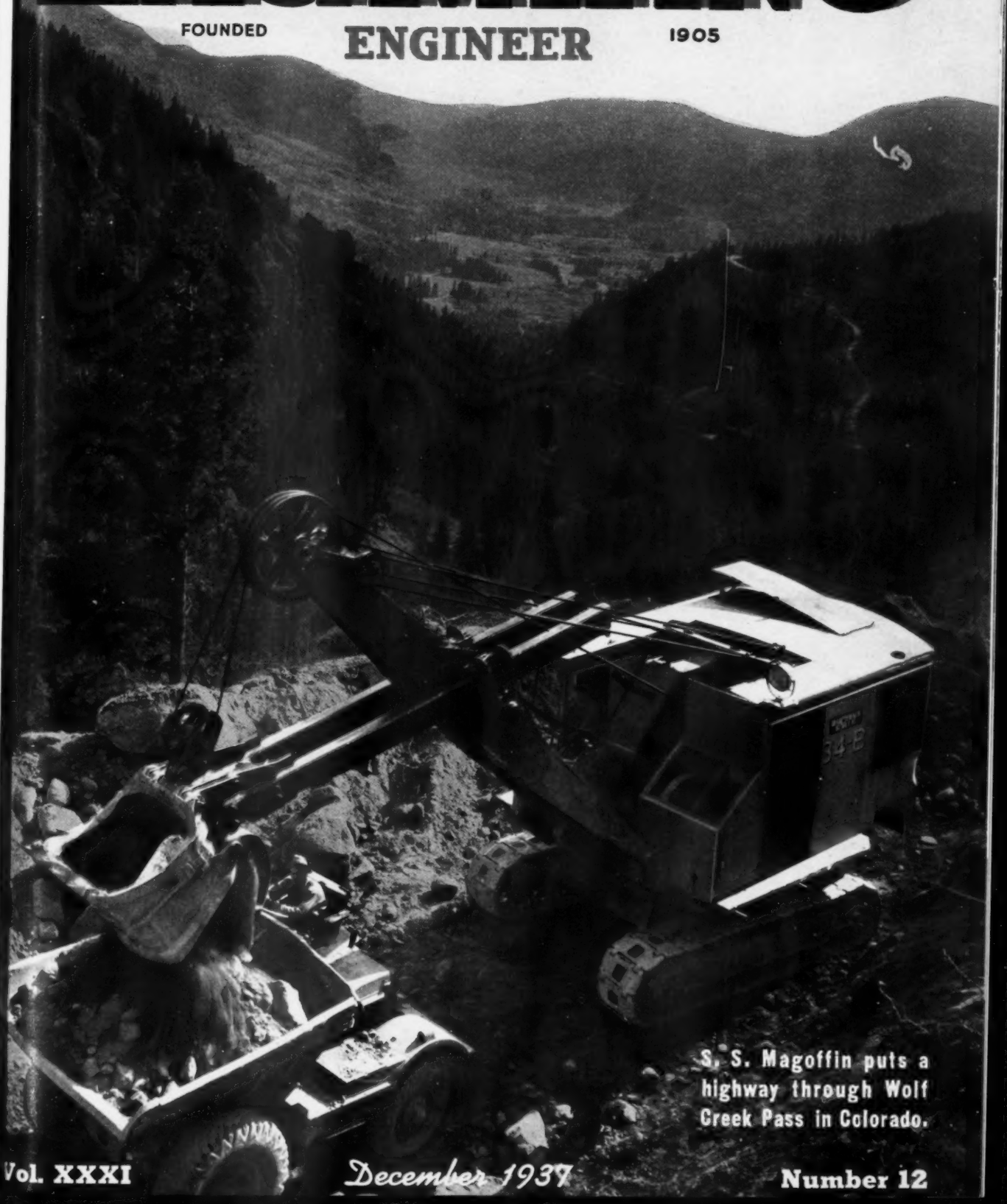
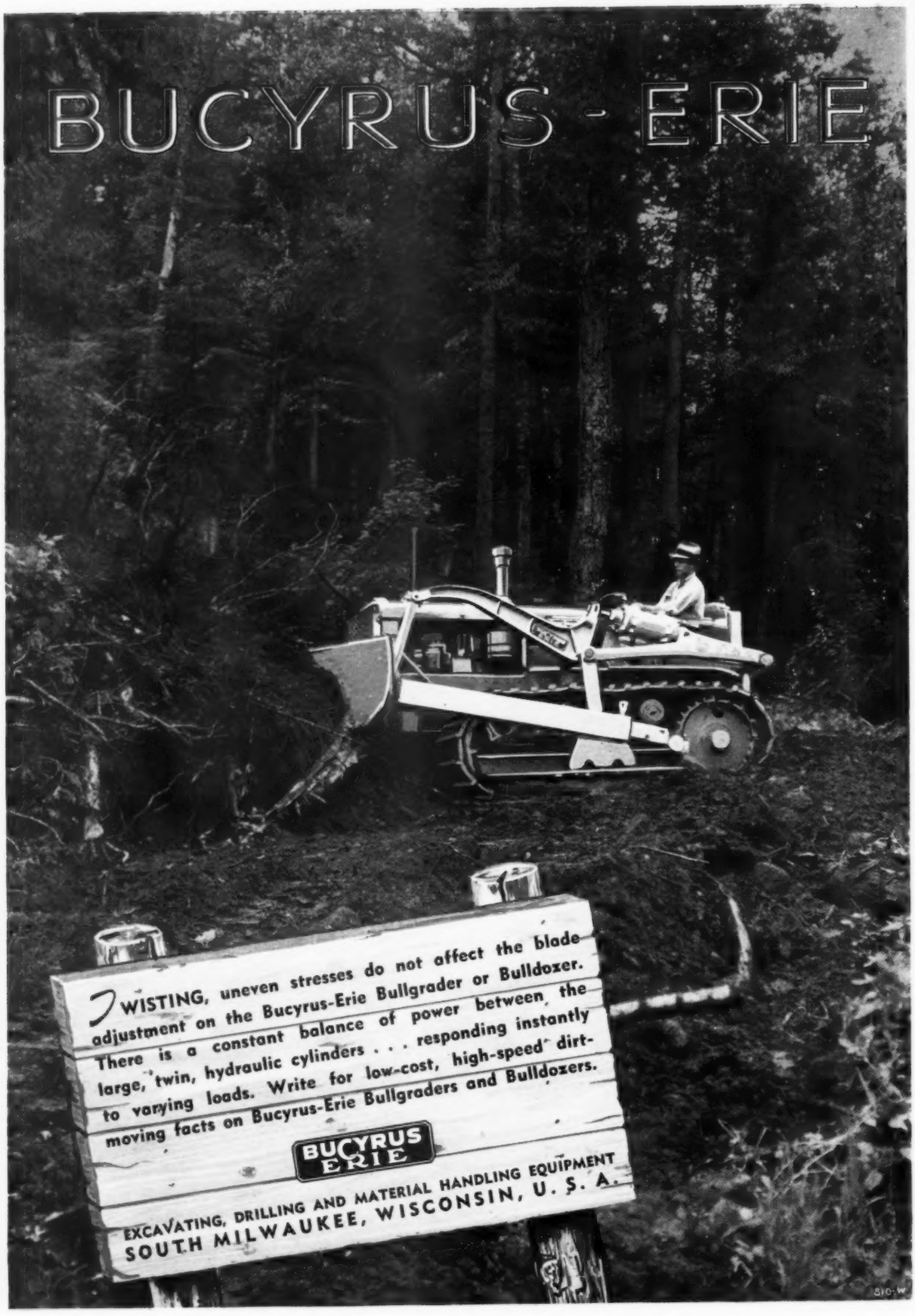
EXCAVATING ENGINEER

FOUNDED 1905



S. S. Magoffin puts a highway through Wolf Creek Pass in Colorado.

Vol. XXXI December 1937 Number 12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TWISTING, uneven stresses do not affect the blade adjustment on the Bucyrus-Erie Bullgrader or Bulldozer. There is a constant balance of power between the large, twin, hydraulic cylinders . . . responding instantly to varying loads. Write for low-cost, high-speed dirt-moving facts on Bucyrus-Erie Bullgraders and Bulldozers.
BUCYRUS ERIE
EXCAVATING, DRILLING AND MATERIAL HANDLING EQUIPMENT
SOUTH MILWAUKEE, WISCONSIN, U. S. A.
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KOEHRING *heavy duty* CONSTRUCTION EQUIPMENT *on parade*

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UP... UP... UP!

go the Demands on Wire Rope

Severest Requirements met by ROEBLING "BLUE CENTER"

To REDUCE operating costs to a minimum, it has been necessary in many instances to increase the capacity of wire rope rigged equipment. Speeds have been stepped up... loads boosted. As a result, wire rope has been called on to meet increasingly severe service.

For many applications where service conditions are severe, ROEBLING "Blue Center" WIRE ROPE has exactly met requirements. *It has proved conclusively that it assures lowest general average operating cost.*

If you are seeking a wire rope of superlative quality, one which will give you maximum safety and durability, at rock-bottom operating cost, investigate Roebling Blue Center... *the highest development in Roebling wire rope manufacture!*

JOHN A. ROEBLING'S SONS CO.
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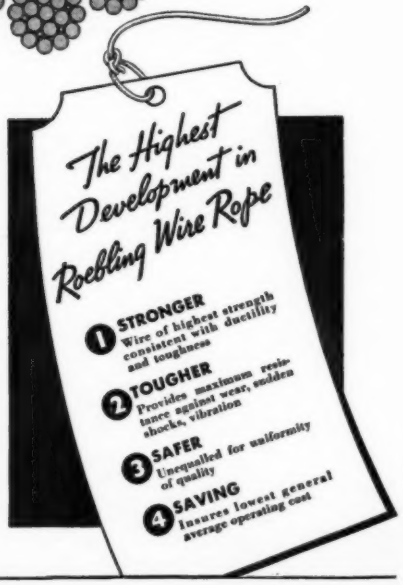
The Highest Development in Roebling Wire Rope
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Wire of highest strength consistent with ductility and toughness
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Provides maximum resistance against wear, sudden shocks, vibration
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Unequalled for uniformity of quality
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Insures lowest general average operating cost

ROEBLING ✸ BLUE CENTER

For your convenience in writing to John A. Roebling's Sons Co., you will find a card bound in this issue.

EXCAVATING

FOUNDED ENGINEER 1905

contents

Vol. XXXI **December, 1937** No. 12

Mountain Pass ..... **Front Cover**

S. S. Magoffin has an interesting highway job at Wolf Creek Pass, Colorado. Recently 60,000 pounds of dynamite, fired in one spectacular shot, brought down a section of mountain one-fifth of a mile long.

Aqueduct Safety — By John R. Marcy **682**

Here are some of the many means used to secure a constantly decreasing accident rate on the Colorado River Aqueduct.

This Will Surprise You — By Fredric Brown **686**

Salesman Williams, still on his vacation, goes "down to the sea in shovels," meets a Mr. Kydd and a sea serpent, but finds no sunken treasure. However you still will be surprised.

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LOOKING AHEAD

These interesting articles will appear in an early issue of EXCAVATING engineer. Watch for them.

Highway Forecast

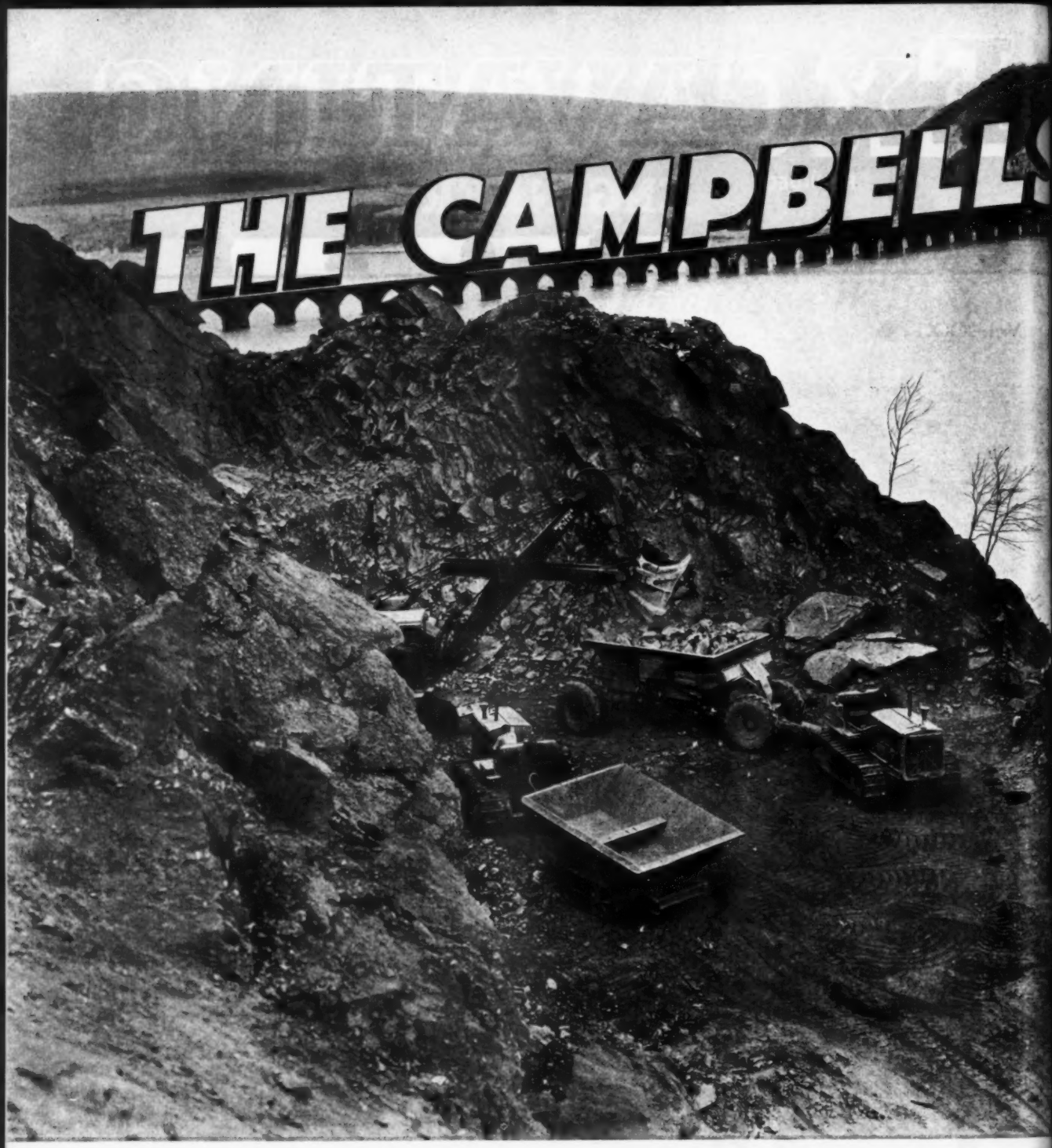
Again, our January issue will feature the complete, authoritative forecast of 1938 highway work in the 48 states. Articles and departments will give you the latest in, about, and for highway building. Don't miss this issue!

For 1938

These articles are scheduled for early issues: Gasoline Tractor Lubrication; Early Gold Dredging; New Coal Stripping at St. David, Illinois; Winding Up at All-American Canal. Roadbuilding, cellar digging, airport construction articles are also on tap. Be sure you get your copy every month.

Limestone

Herzog Lime & Stone Company uses 3-yard electric shovel in loading to small, speedy trucks which cut hauling costs.



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ARE COMING

with "CATERPILLAR" DIESELS

• Where Pennsylvania's State Highway Route 5 parallels the Susquehanna between Enola and Marysville, H. T. Campbell Sons Company, of Towson, Md., has a contract for moving 1,950,000 cubic yards of rocky material . . . to build a stretch of road just under a mile long.

• The Campbells are coming along fine, with 13 "Caterpillar" Diesel Tractors and a battery of dump-wagons, one of which is the new LaPlant-Choate rubber-tired rig of 19-cubic-yard capacity. In fact, they are well ahead of schedule, thanks to good management and the right mechanical equipment. Earth-moving is big business today, calls for the best in tractors and wagons. You know which!

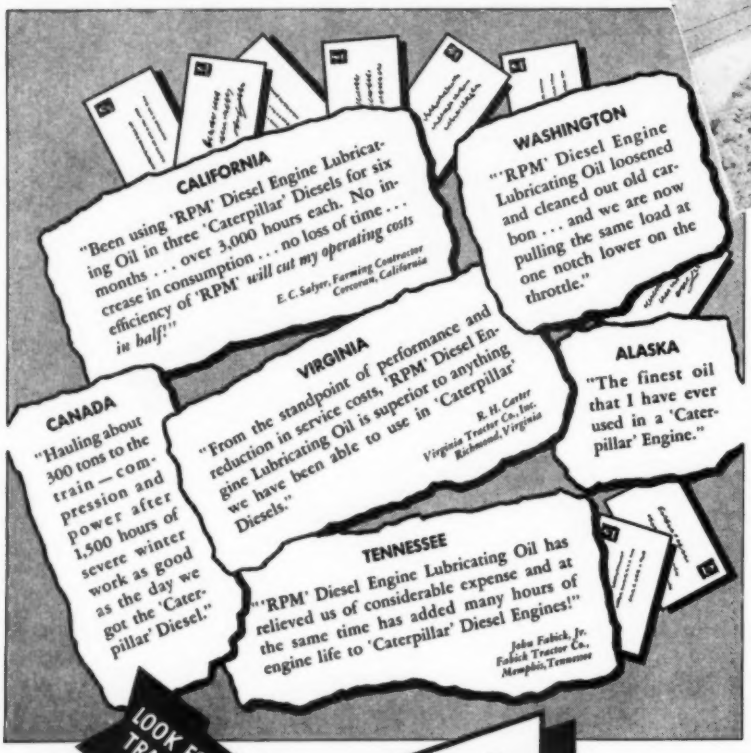
MOVING MOUNTAINS IS A JOB . . . a job for "Caterpillar" Diesel Tractors and big dump-wagons, like the LaPlant-Choate 19-cubic-yard, rubber-tired, bottom-dump rig shown under the shovel. They pull into position . . . take it on . . . take it away.

TRACTOR CO., PEORIA, ILL.

LARGEST MANUFACTURER OF DIESEL ENGINES, TRACK-TYPE TRACTORS AND ROAD MACHINERY

PROOF

that you can get better performance and cut costs with "RPM" DIESEL ENGINE LUBRICATING OIL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"Been using 'RPM' Diesel Engine Lubricating Oil in three 'Caterpillar' Diesels for six months . . . over 3,000 hours each. No increase in consumption . . . no loss of time . . . efficiency of 'RPM' will cut my operating costs in half!"
E. C. Salyer, Farming Contractor Corcoran, California
WASHINGTON
"'RPM' Diesel Engine Lubricating Oil loosened and cleaned out old carbon . . . and we are now pulling the same load at one notch lower on the throttle."
VIRGINIA
"From the standpoint of performance and reduction in service costs, 'RPM' Diesel Engine Lubricating Oil is superior to anything we have been able to use in 'Caterpillar' Diesels."
R. H. Carter Virginia Tractor Co., Inc. Richmond, Virginia
ALASKA
"The finest oil that I have ever used in a 'Caterpillar' Engine."
CANADA
"Hauling about 300 tons to the train — compression and power after 1,500 hours of severe winter work as good as the day we got the 'Caterpillar' Diesel."
TENNESSEE
"'RPM' Diesel Engine Lubricating Oil has relieved us of considerable expense and at the same time has added many hours of engine life to 'Caterpillar' Diesel Engines!"
John Fabick, Jr. Fabick Tractor Co., Memphis, Tennessee

LOOK FOR THIS TRADE MARK

RPM
REG. TRADE-MARK
DIESEL ENGINE LUBRICATING OIL

Caution: **There is only one Diesel engine lubricating oil identified by the "RPM" trade-mark.**

DAY after day come letters from everywhere — acclaiming "RPM" Diesel Engine Lubricating Oil! It's proof that patented super-active "RPM" Diesel Engine Lubricating Oil will keep your "Caterpillar" Diesel Engine at its peak efficiency throughout a heavy, strenuous season.

It's proof that the bugbears of carbonization, sludge and excessive overhauls for carbon removal have been licked.

Test it for yourself. Insist on the *patented* lubricant identified by the "RPM" trade-mark. Recommended by Caterpillar Tractor Co. — and by Diesel engine operators in all corners of the globe.

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TIMKEN BEARINGS

INCREASE RESALE VALUE

Tapered Roller
TIMKEN BEARING
EQUIPPED

A symbol of quality for any piece of equipment with which it is associated

Scraper wagons equipped with 8 TIMKEN Bearings; 2 bearings per wheel. Manufactured by Bucyrus-Erie Co., South Milwaukee, Wisconsin.

There was once a time when construction equipment was junked after the "big job" was completed. Today, construction equipment is not thrown into a pile and there permitted to write its own epitaph in rust; instead—it is sold.

This is possible since modern construction equipment is designed and built to give dependable service far outlasting similar equipment built a decade ago. Because TIMKEN Bearings are important factors of long machine life, Bucyrus-Erie, like other leading manufacturers of construction equipment, uses TIMKEN Bearings. TIMKEN Bearings hold shafts in correct and constant alignment, eliminate friction and carry all loads—radial, thrust or any combination of the two.

The Rock Island "Rockets" Roll On TIMKEN Bearings

GLIDE—as you ride a Timken-equipped train

Thus, construction machines that are Timken-equipped have two definite advantages; (1) they assure dependable performance while you use them; (2) they command a higher price when you sell them.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

Manufacturers of Timken Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; Timken Alloy Steels and Carbon and Alloy Seamless Tubing; Timken Rock Bits; and Timken Fuel Injection Equipment.

TIMKEN
TAPERED ROLLER BEARINGS

For your convenience in writing to The Timken Roller Bearing Company, you will find a card bound in this issue.

Tunneling is a Hercules Job

The opening of the Broadway Tunnel connecting Oakland (Alameda County) with Contra Costa County marks another big construction job made possible by Hercules explosives and Hercules service.

Contractor R. G. Clifford, of San Francisco, used Hercules explosives exclusively in completing the work on the 2,900-ft. twin bore that is winning acclaim on the West Coast.

For tunneling and all rock-moving work, get the economy and performance of Hercules explosives and make use of Hercules technical service.

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25th Anniversary Year

HERCULES POWDER COMPANY
Incorporated
972 KING STREET
WILMINGTON, DELAWARE

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"SINCE MY LAST CALL ON THE ABOVE PLANT I FIND"

—*A Typical Beginning* of some 25,000 impartial reports by Socony-Vacuum Field Engineers...to guide us in refining oils suited to actual Plant conditions

How Socony-Vacuum Engineering Service can save money in your plant:

1. Curb losses that boost power consumption and costs.
2. Decrease maintenance.
3. Improve production results by greater machine efficiency.
4. Lower lubrication costs.
5. Help your men find ways to devise important economies.

TONIGHT—in hotels across the country—Socony-Vacuum Field Engineers are writing their reports!

News of what Gargoyle Lubricants did today *in service*.

News of new methods...problems.

These hard-boiled facts leave no loopholes. Gargoyle Lubricants must meet operating conditions!

Because they do—Socony-Vacuum "Correct Lubrication" has saved millions in 110 different industries. Improved production. Lowered power, maintenance and oil costs.

The advice of a Socony-Vacuum Engineer may result in surprising economies in your own plant. A word from you will bring him there.

SOCONY-VACUUM

CORRECT LUBRICATION

GARGOYLE Lubricants

SAVES MONEY FOR INDUSTRY

Read what 71 Years' Lubricating Experience...the Greatest in the Oil Business...can do for You. See Next Page.

THIS MARKETING POLICY MEANS "CORRECT LUBRICATION" FOR EVERY TYPE OF PLANT

INDUSTRY ALMOST ALWAYS FINDS that the controlled use of high-grade Gargoyle Lubricants pays for itself many times over and that they actually cost less to use than ordinary lubricants.

But, for such equipment as does not justify the highest-grade lubricants, Socony-Vacuum Engineers will always recommend a lower-priced lubricant when consistent with true economy.

Socony-Vacuum, with a complete line of products, can supply the lubricants best fitted for the requirements of the individual lubricating job as determined by specific operating conditions.

Socony-Vacuum Engineers bring you years of world-wide experience and direct cooperation with manufacturers of equipment. Lubrication Profit is the inevitable result.

SEND FOR THE SOCONY-VACUUM REPRESENTATIVE: *The services of a trained Socony-Vacuum Engineer are available at all times in helping your men to solve lubrication problems.*

SOCONY-VACUUM OIL CO.

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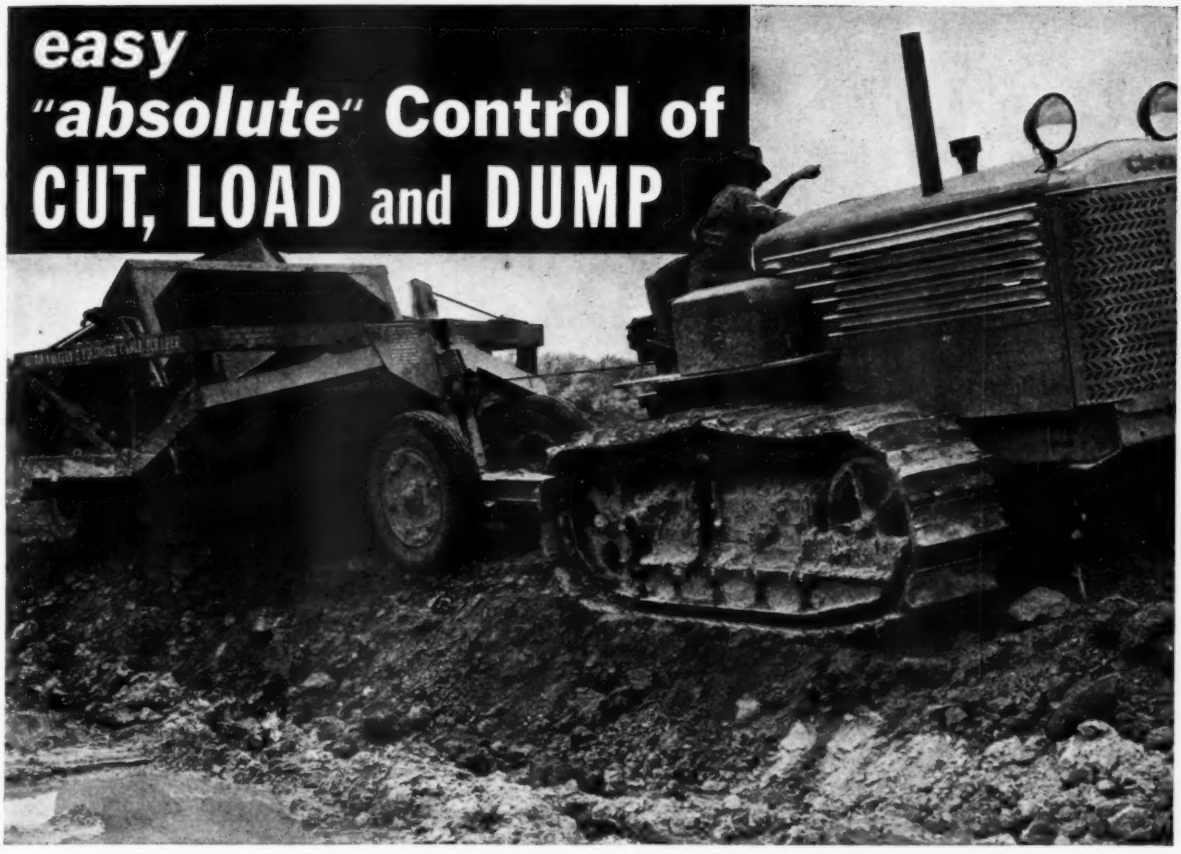
GARGOYLE Lubricants



5-Yard Tractor Scraper Has Greatest Dirt Moving Capacity Per Dollar Invested

● Here is a very simple machine with extraordinary capacity for moving dirt on a wide variety of jobs. Per dollar invested we know of no equipment that can pay you a higher return than the 5-Yard Tractor Scraper.

This fast stepping machine has easy, *absolute* control . . . Wheels track inside cut and the pan floor is level with ground for easy digging. Makes 180° turns, assuring quick return from dump and easy handling. The operator from his seat on the tractor can dump the entire load or spread it to any depth up to nine inches while traveling at full speed ahead.

Built to withstand severe usage. Electrically welded construction. Single cable operating from winch on tractor controls all operations. 35-40 h.p. tractor is ample power under normal working conditions.

THE AUSTIN-WESTERN ROAD MACHINERY CO.
AURORA, ILLINOIS

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The **Austin-Western** *5 Yard Tractor Scraper*

THE AUSTIN-WESTERN ROAD MACHINERY CO.
1821 Barrows Street, Aurora, Illinois

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Tell me more about:

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☐ Shovels and Cranes	

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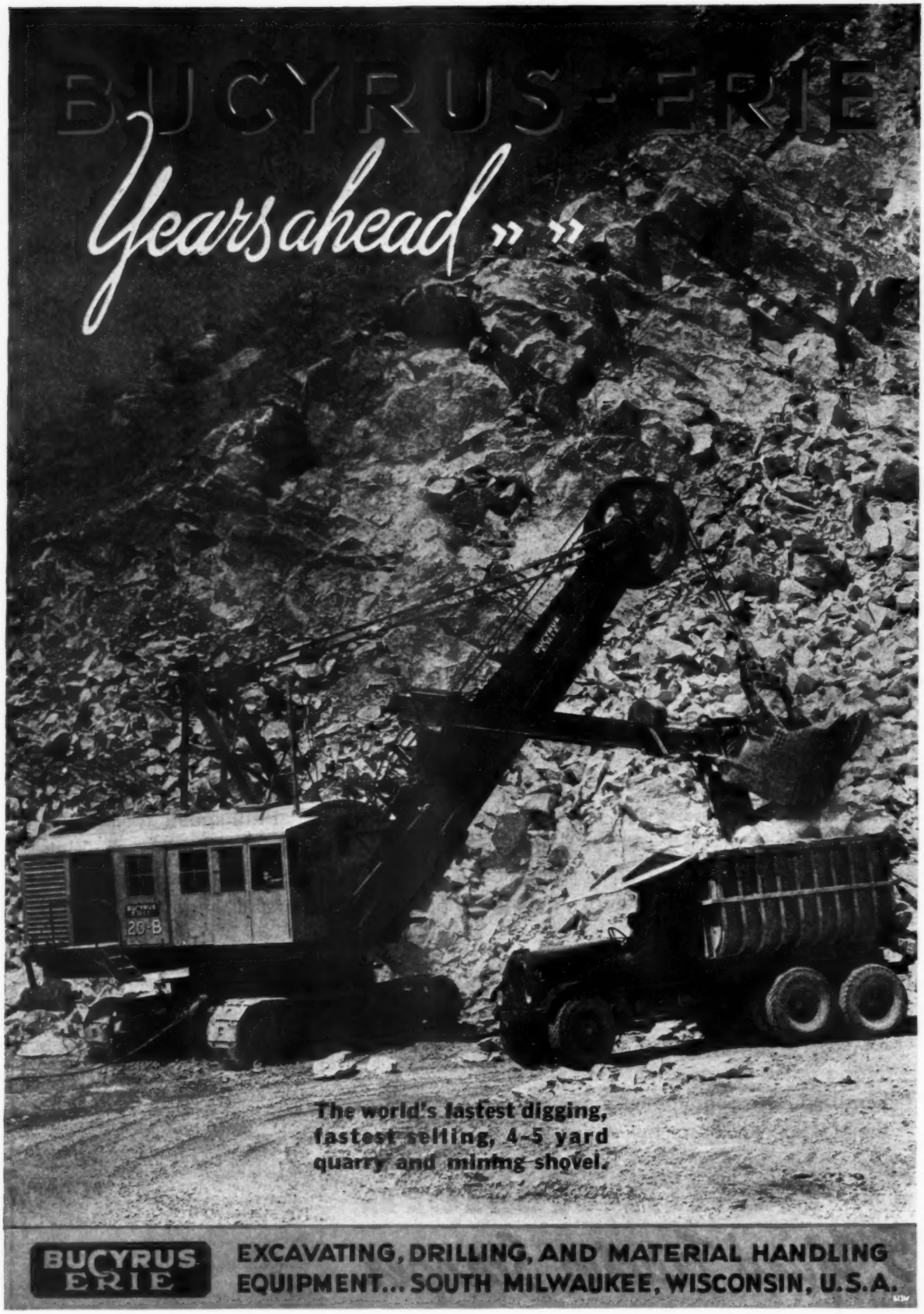
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Years ahead
The world's fastest digging, fastest selling, 4-5 yard quarry and mining shovel.
BUCYRUS ERIE
EXCAVATING, DRILLING, AND MATERIAL HANDLING EQUIPMENT... SOUTH MILWAUKEE, WISCONSIN, U.S.A.

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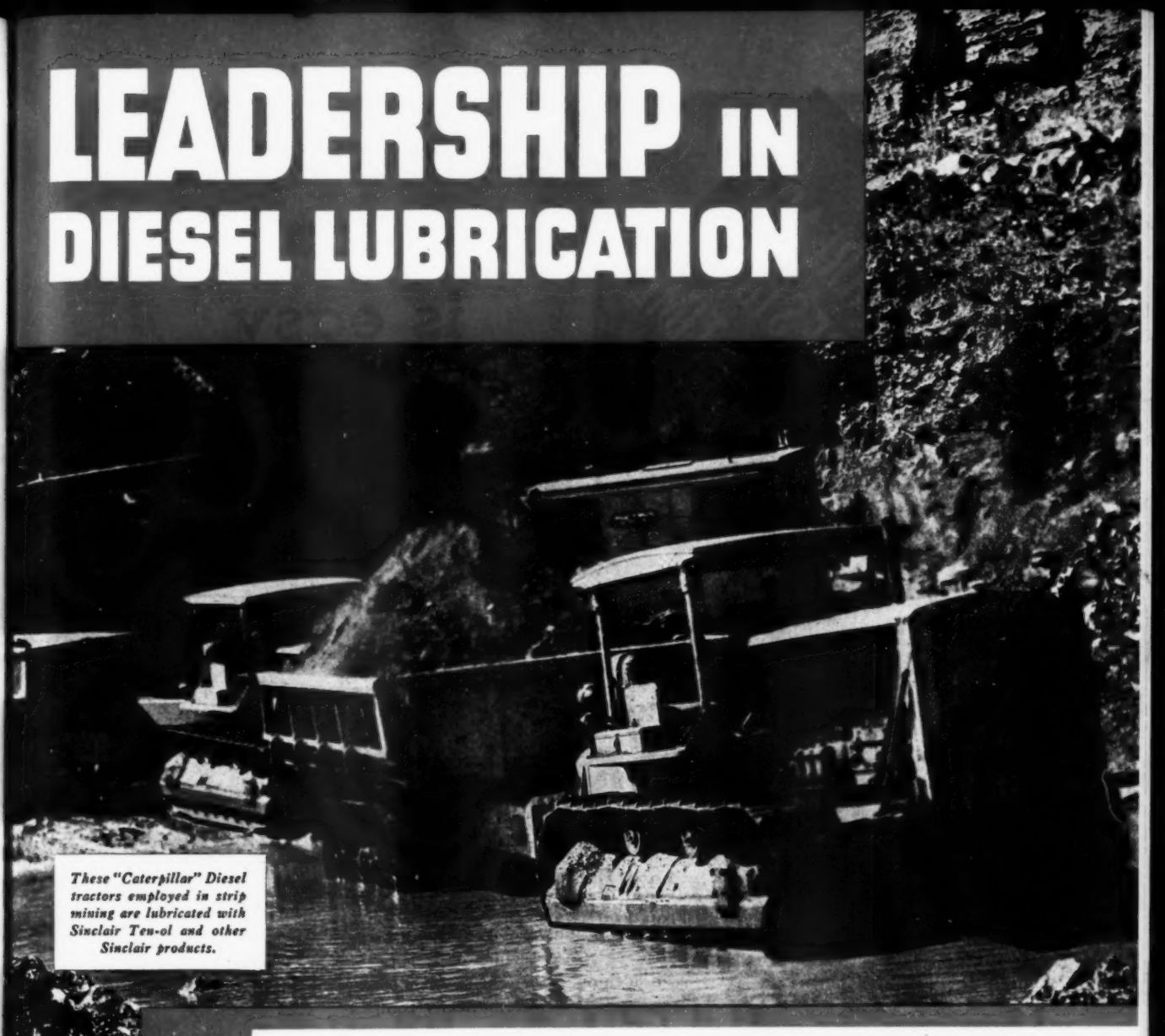
LEADERSHIP IN DIESEL LUBRICATION



These "Caterpillar" Diesel tractors employed in strip mining are lubricated with Sinclair Ten-ol and other Sinclair products.

SINCLAIR TEN-OL

REG. U. S. PAT. OFF.

Less than a year ago Sinclair introduced Ten-ol, a lubricant as rugged in service performance as the "Caterpillar" Diesel engines for which it was developed.

Wide acceptance put Ten-ol to the most convincing of tests—showdown of performance under the toughest operating conditions. For example, in mining and quarrying... in road building ...on public projects.

"Caterpillar" Diesel operators find Ten-ol increasing service hours, giving sustained top-notch engine performance, and providing full lubricating protection under emergency overloads. That's why it is recommended as a "new, outstanding Diesel engine lubricant" by Caterpillar Tractor Co.

Try Sinclair Ten-ol and Sinclair Diesel fuel. Order them and other Sinclair products from your local Sinclair office, or write Sinclair Refining Company (Inc.), 630 Fifth Avenue, New York, N. Y.

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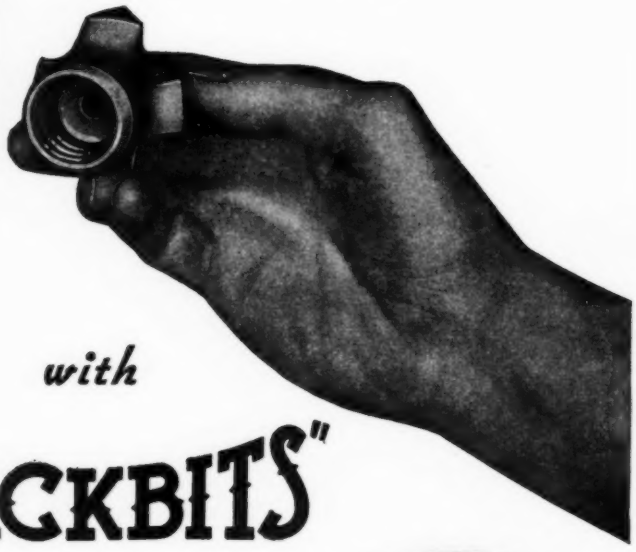
SINCLAIR TEN-OL

is recommended as a "new outstanding Diesel engine lubricant" by Caterpillar Tractor Co.

THE THREAD DESIGN SAVES TIME

Instant changing to sharp bits is easy



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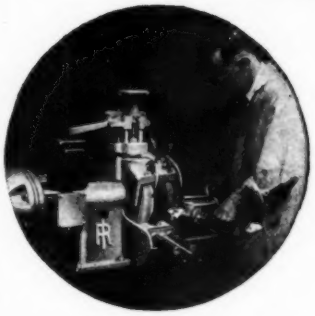
"JACKBITS"

Jackbits are made in many sizes and styles for all conditions.

The Jackbit thread is strong, long-lived, and above all it keeps the Jackbit tight without interfering with the ease of detachment. It acts like a locking cam. The thread design permits it to automatically compensate for wear.

The ease with which the Jackbit thread can be put on this rod has contributed greatly to the tremendous success of Jackbits. Jackrods can be threaded with either a hand threading tool; a power-operated machine; a lathe; or an Ingersoll-Rand sharpener.

Ask for Bulletin No. 2304. It gives full information, with dimensions and prices.



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The Rayner Construction Co., Leaside, Ont., Canada, moves dirt fast on this road job with the International TD-40 Diesel TracTracTor.

For *Economical* Power, Depend on INTERNATIONAL

The increasing ACCEPTANCE of International Industrial Power by experienced operators is *proof* that this organization is building to their requirements. On job after job, the *tough* work is being given to International Power. Users know that when RESULTS are needed, it is good business to depend on International.

International Harvester builds for low cost of maintenance as well as for low cost of operation. International TracTracTors are the *most accessible crawler tractors on the market.* Replaceable cylinders in International engines are a great money-saving feature. Many other refinements in these products, plus *quality* construction in every detail, mean money in the user's pocket.

Bank on International Harvester, world's largest tractor builder, when you have a power problem. The International Industrial Power line includes wheel and crawler tractors (gasoline and Diesel), and power units (gasoline and Diesel) ranging up to 110 max. h.p. See the nearby Company-owned branch or industrial dealer for complete information.

INTERNATIONAL HARVESTER COMPANY
(*Incorporated*)
180 North Michigan Ave. Chicago, Illinois

INTERNATIONAL Industrial Power

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1 No. 3375

The Metropolitan Water District
of Southern California

Date _____ 193__

SAFETY ORDER

Extensive and continuous program pays big dividends in reducing accidents and insurance rates.

By JOHN R. MARCY

BUILDING California's Colorado River Aqueduct with its 392 miles of hard-rock tunnels, lined canals, and covered conduit, has from the very outset presented a great many hazards. 10,000 men, many of them inexperienced because of residence restrictions, working night and day from one to three hundred miles to the nearest city, often in temperatures of 120 degrees in the shade, handling heavy materials, tons of explosives, huge machines—yes, plenty of hazards there.

Today, however, with the tunnels practically completed, and the whole about four-fifths finished, the accident frequency is now 30% lower than the five-year average frequency for comparable heavy construction in California, and each year has seen a 28% reduction in the rate. Thousands of dollars have been saved in man-hours and reduced insurance costs, and the saving in terms of human life and limb and pain are incalculable.

The aqueduct's efficient safety program is responsible for this splendid work. It deserves the attention of all concerned in construction work.

F. E. Weymouth, General Manager and Chief Engineer of the Metropolitan Water District of Southern California, laid down the general safety policy that has been followed throughout the project. His firm attitude toward safety is indicated by this statement: "No single phase of the aqueduct construction has been given more thorough study by the Board of Directors and staff of the Metropolitan Water District than safety. From the very beginning of the work it has been the aim to make the aqueduct a safe job. One thing must be understood — from the Colorado River to Los Angeles, we mean business about safety, and insist at all times upon full cooperation from everyone concerned."

Features of Safety Program

In line with this policy, the following features of the safety organization were set up and put into operation:

Adequate safety and health provisions were included in the construction specifications.

A Safety Engineer, T. W. Osgood, and staff, were employed by the District soon after the construction work had been started. Their duties were to study the problems of the job; advise the supervisors of the hazards and of corrective measures; cooperate with the supervisors in the conduct of their safety work; and keep the executives and supervisors advised of the accident trend, of the causes and consequences of accidents, and of measures for preventing accidents.

The Division Engineers were to take an active part in the safety program, and by provisions of the construction specifications, were vested with authority to enforce the health and safety regulations whenever necessary.

The District's executives, recognizing that accident prevention is fundamentally a supervisory responsibility, placed upon the construction superintendents, and upon those in a charge of allied work, the duty directly to prevent accidents.

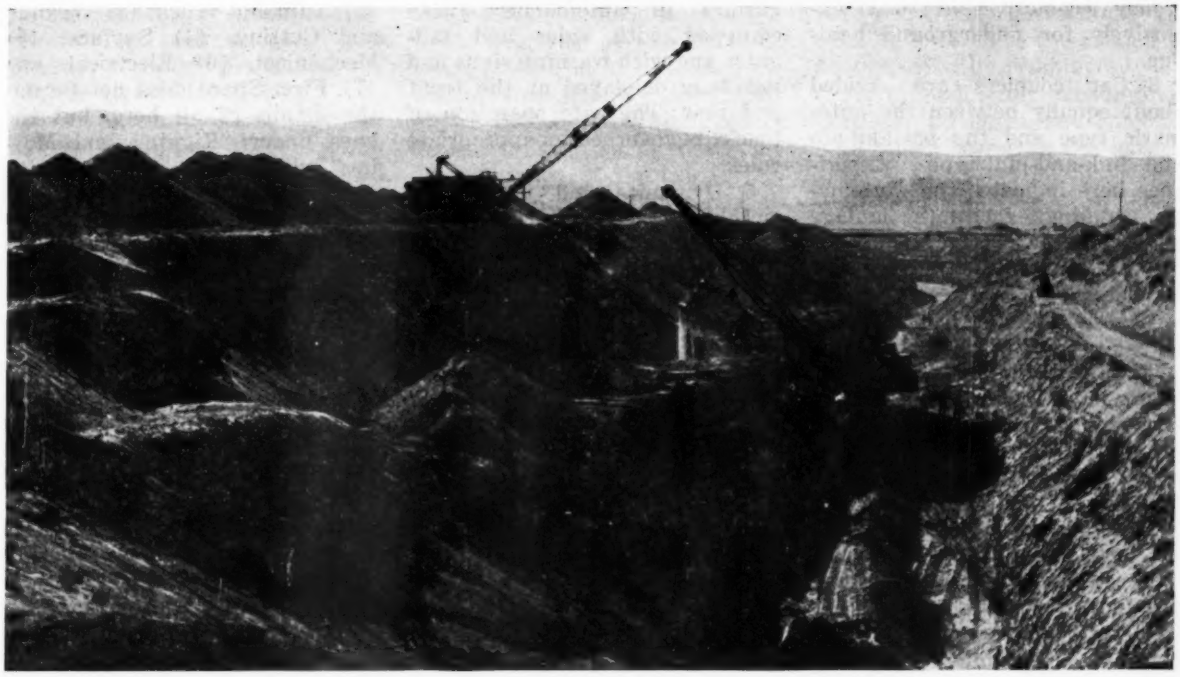
A comprehensive safety program was adopted by the District in the early stage of the construction work and immediately put into effect. This program provides for inspection and written reports of all work; organization and functioning of camp and general safety committees and safety clubs; bulletin boards and bulletins; first-aid training; mine rescue equipment and rescue squads; safety rule books; safety literature; safety talks; safety contests; accident statistics; and membership in the National Safety Council.

The safety measures which have been practiced will be better understood if some idea is had of the magnitude of the project.

Preparatory to actual construction, the District built and put into operation 150 miles of surfaced highways, 448 miles of electric transmission lines, 285 miles of telephone lines, and 180 miles of water mains, together with a system of wells, pumping, and chlorination plants.

A Whale of a Job

The principal features of the project are: (1) Parker Dam across the Colorado River, of concrete arch design, 800 feet long and 315 feet high. (2) The main



● The cut on this stretch of aqueduct was so deep a team of two draglines was necessary to get the dirt up. Strict adherence to complete safety rules lowered accident rate for this type of work.

aqueduct, with 92 miles of 16-foot tunnels, 62 miles of lined canals, 55 miles of conduit, and 29 miles of siphon. Five pumping plants will lift the water 1,617 feet. Power for them comes from Boulder Dam over 237 miles of transmission line. One billion gallons per day is the capacity of the main aqueduct. (3) Cajalco Reservoir. At the junction of the main and distribution lines, this reservoir is formed by an earth dam 2600 feet long and 194 feet high, and a dike 7600 feet long and 90 feet high. The two structures require the placing of 8,000,000 cubic yards of earth. (4) The distributing system embraces 16 miles of smaller tunnels and 51 miles of pipe lines.

Along the 392 miles of the project there are construction camps which are models of sanitation and comfort. Refrigerated trucks deliver food-stuffs to refrigerators at the camps and meals are wholesome, abundant, and varied. Laundry service is available and there is daily mail service. First-aid supplies are maintained at points accessible to the work; there are first-aid stations in charge of trained nurses at the various camps; and well equipped hospitals with surgical and medical staffs of high standing are located at strategic points along the aqueduct.

Such is the general picture of the project.

Safety Work in Two Classes

The accident prevention methods which have been put into practice to safeguard the 10,000 workmen fall under two general headings: "Timely Elimination of Hazards" and "The Development of the Safety Spirit Within the Entire Organization."

The elimination of hazards has been well served by generally good and, for the most part, new mechanical and electric machinery, and other equipment. These have been kept in a good state of repair and hazardous points are guarded so far as practical. Goggles, respirators, hard-toe shoes and other protective devices are used. All workmen and other persons, while in a tunnel, are required to wear protective hard hats.

The tunnels represented the greatest hazard, and safety procedure was worked out in great detail for them, and rigidly enforced.

In tunnel driving operations, water is applied in the drill holes and on the muck piles to eliminate dust; headings are barred down after each blast and timber or steel support is placed wherever necessitated by unstable rock or ground. On September 1, 1937, 104 miles of tunnel had been bored, 69.7 miles had been supported by steel and timber and 10 miles gunited, prior to placing concrete lining.

In two of the 37 tunnels excessive quantities of water were encountered at certain headings. In the San Jacinto 13-mile tunnel, the maximum inflow at one heading was 7500 gpm. Measures carried out to eliminate this hazard embraced the drilling of test-holes 20 or more feet ahead of the face; the construction of bulkheads; pressure grouting; placing heavy tunnel support; and the installation of 30-inch water pipe lines and heavy duty pumping units.

Tunnel haulage safety provisions include:

1. Man-cars of various design are provided for safe and comfortable transportation of tunnel workers. They are pulled, not pushed by the locomotives.

2. Electric battery and electric

trolley locomotives are used exclusively for underground haulage.

3. Car couplers are divided about equally between the automatic type and the bar-and-pin and link-and-pin types. Experience here indicates that automatic couplings facilitate haulage and from the safety angle they are far superior to other types of couplers.

4. Other haulage safety features are good trackage with the switch frogs and guard rails blocked with wooden wedges to prevent men's feet being caught, lights at both ends of trains, block signals and rules for safe operation of trains.

Tunnel illumination is provided by electric circuits.

Ventilation in the tunnels is provided by blowers of suitable capacity and 20 or 22 inch pipe lines for conducting air from the surface to tunnel headings. After blasts have been fired, the powder smoke is exhausted by reversing the air current for about 15 to 30 minutes.

At completion, about 21 million pounds of explosives will have been used in tunnel excavation and a total of 28 million pounds on the entire aqueduct. Every possible safeguard is thrown around the storage, transportation and use of explosives, the principle features being:

Explosive Protection

1. Fire-proof, bullet-proof and well-ventilated first class magazines are provided on the surface for the separate storage of dynamite and blasting caps, for making primers, and for slitting dynamite cartridges.

2. Second class portable magazines for the separate storage of dynamite and primers in quantities not exceeding 100 pounds are constructed of two-inch planks and are placed as indicated for first class magazines.

3. The sign "MAGAZINE—EXPLOSIVES — DANGEROUS" is posted conspicuously on all magazines and they are kept locked whenever unattended by an authorized person.

4. Explosives are transported from railroad sidings to the magazines in automobile trucks equipped with sides and tailgates and with warning signs and red flags displayed at the front and rear. The safe operation of trucks is governed by appropriate rules.

5. Dynamite and primers in suitable boxes are transported from magazines to tunnel headings in separate powder cars, or in two-compartment powder and primer cars.

6. Smoking and open flame are prohibited at any place where explosives are stored or handled.

7. Electric detonation, employing 440-volt alternating current is used exclusively for firing blasts at tunnel headings.

8. Rules governing the safe storage, handling and use of explosives on tunnel work are made operative on the surface wherever applicable.

Under these eight features are grouped a great many detailed regulations, especially in the matter of detonation, where practically every step is prescribed and rigidly adhered to.

Safety regulations have been laid down for every phase of work on the project, under the headings of (1) Rigging and Moving, (2) Auto and Truck, (3) Welding and Cutting, (4) Surface, (5) Mechanical, (6) Electrical, and (7) Fire. Space does not permit the details of all here, but the ones under "Rigging and Moving" will serve as typical of the rest:

Safe Rigging Rules

1. Helpers on revolving cranes and shovels shall keep within plain view of the operator.

2. Whenever power shovels or cranes are being used to load trucks the material being loaded shall not be swung over the truck cab when the driver is in the cab.

3. Whenever trucks are being backed up in places where workmen may be in the path of travel, adequate warning shall be given with the horn at intervals until the backing operation is complete.

4. In power shovel or crane operations it is essential that workmen keep out of range of the swinging dipper and the rocks which may fall from it.

5. In all conveying, hoisting, or

● Thousands of tons of explosives have been shot to aid aqueduct digging. Safety precautions are especially important here.

loading operations, no man shall be carried on any device not intended for such purpose. The practice of riding the load or the hook is forbidden.

6. In all conveying, hoisting or loading operations where the machine operator depends upon signals, one man only shall give signals and all men involved in any such operations shall be so instructed.

7. The signal code used for crane or hoist operations shall conform to that specified in the safety orders of the Industrial Accident Commission of the State of California.

8. Every person in charge of operations involving ropes, slings, chains, cables, blocks, etc., shall have a thorough knowledge of the safe loads which may be applied. Frequent inspections shall be made so that all such equipment will be maintained in safe working condition.

9. In all hoisting operations, the hooking up shall be completed before the signal to the hoist is given.

10. In hoisting materials, great care shall be taken to see that the load is properly secured.

11. Only experienced men shall make slings, or hook on loads.

12. Whenever tripods or shear legs are used in any hoisting operation they shall be adequately guyed, but the guys shall not be depended upon to support any appreciable part of the load.

13. When cable slings or hoisting cables are secured by Crosby or other similar clamps, at least three clamps shall be used for such connection, and such clamps shall be so applied that any slippage will tend to bring the clamps together.

14. When more than one eye bolt is used in hoisting or suspending any load, the slings of which are attached to a common hook, the slings shall be of sufficient length, or spreader shall be used so that the angle made by any sling member with the vertical shall not exceed 30 degrees.

15. See that the work is carried on in an orderly manner, such that workmen are not apt to stumble over the material being handled, or to be tripped by the unevenness of the surface upon which they are standing. Guy ropes must be attached to any load which is liable to swing or tip over.

16. Whenever any piece of equipment is not being used for considerable length of time, the arm, bucket, dipper, hook or other part which may accidentally fall shall be lowered to the ground or be supported by cribbing.

17. In loading or unloading operations, no short cut shall be used which increases the hazard.

18. When skids are used they shall be of ample strength and be securely placed.

19. Men shall not work between incline skids unless the load is securely blocked.

20. In piling pipe, it shall be so placed and blocked that there will be no danger of the pipe rolling from the pile.

21. In handling pipe, use stranded steel cable sling wherever practicable.

22. Life-lines and safety belts shall be worn in all operations in which their use may prevent an accident.

Besides these, there are general rules covering every possible hazard, and the whole is incorporated in a manual with which all workers must be familiar and apply.

Inspections of all working places are made by the Safety Engineer and the Division Engineers of the District. Unsafe conditions and practices found to exist are entered on the "Safety Order Form," copies of which are furnished to those responsible for safety, and the hazards are corrected at once. In the main, safe working conditions have been realized through friendly relations and cooperation among all concerned.

● **Pouring concrete at Parker Dam, the men had safety kept constantly in their minds through signs like the one on this bucket.**

Building Pride in Safety

Not less important than safety regulations has been the "safety spirit," which has been developed throughout the entire organization. This has encouraged safe practice and otherwise contributed liberally to accident prevention. The means employed to develop this spirit are:

1. Safety committees and safety clubs, representative variously of the District's and contractors' executives, supervisors, engineers and workmen, hold meetings each month at convenient points

(Continued on page 714)

This Will Surprise You

Our William Williams makes good use of two kinds of booms and a sea serpent, which he finds ordinary incidents in a search for sunken treasure.

By FREDRIC BROWN

Illustrated by J. A. Patterson

• "Owing to my meeting with a Mr. Kydd, I see a chance to make a good investment."

Letter from William Z. Williams, Swamporia, Fla., to D. Itch, President, The D. Itch Digger Co., Circle Center, Ohio:

Dear Mr. Itch:

This will surprise you, because I know you think I am down here in Florida for a vacation, and here I am ordering a shovel from you again. I'm surprised myself, because here I am starting in on something new and I thought I was on a vacation myself.

But my bank account is getting down again to a few thousand and owing to my meeting Mr. Kydd last week here in Swamporia, I see a chance to invest it so that it will bring tremendous returns.

I want you to send me at once one power shovel, gas, Diesel or electric, about 1-yard or thereabouts, with an entirely enclosed water-tight cab, for digging under water. Maybe you don't carry them in stock; if not, you can have such a cab put on one of your regular models; better use unbreakable glass, so the water-pressure won't break it in. Can you ship it within 24 hours?

Sincerely yours,
WILLIAM Z. WILLIAMS

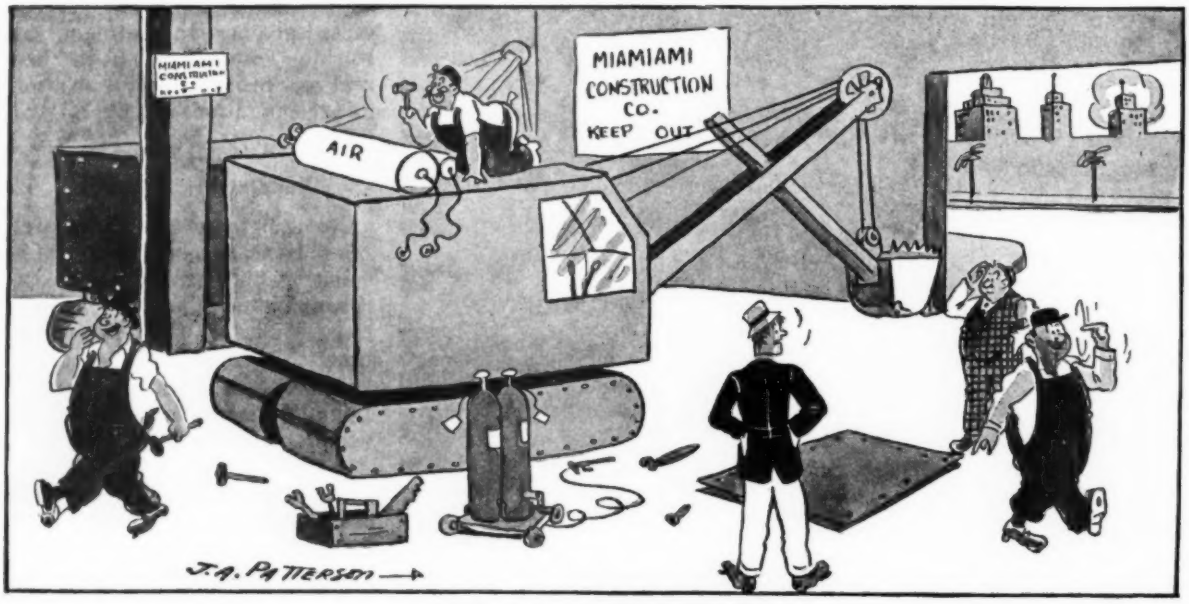
Letter from D. Itch, President, the D. Itch Digger Co., Circle Center, Ohio, to William Z. Williams, Swamporia, Fla.:

Dear William:

I'm afraid that there isn't much practicality in the idea you have. Power shovels aren't made for under water work.

What you want is a dredge, which is a flatboat equipped with a clamshell. These are used for underwater work.

If you will tell me in greater detail just what you are intending to do, I can make a more specific recommendation of just the equipment you need to



• "They look at me rather strangely."

take care of it. If any stock model we have will serve your purpose, we can make immediate shipment.

Cordially yours,
D. Itch

Telegram from William Z. Williams to D. Itch, President, the D. Itch Digger Co.:

D. Itch Digger Co.:

I DONT WANT A DREDGE STOP HOW CAN I SEE WHAT I AM DIGGING WITH A DREDGE STOP WHY CANT A POWER SHOVEL BE EQUIPPED WITH AN ENCLOSED CAB SO THAT IT CAN RUN RIGHT INTO THE WATER AND I CAN SEE WHAT I AM DOING STOP I INTEND TO DIG FOR BURIED TREASURE WHICH IS BURIED UNDER WATER ABOUT HUNDRED FEET FROM SHORE UNDER ABOUT FIFTEEN OR TWENTY FEET OF WATER OVER ROCKY BOTTOM STOP

Williams

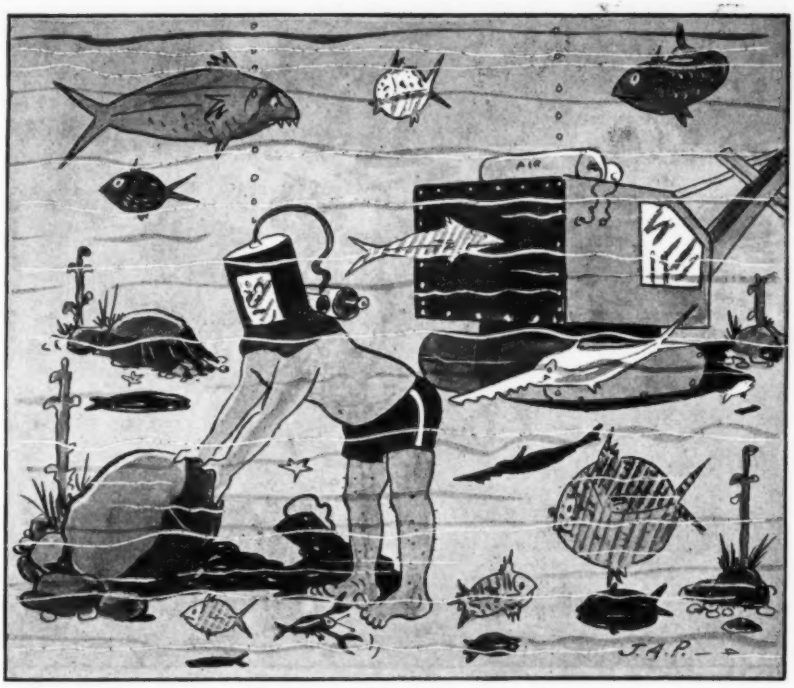
Airmail letter from D. Itch, President, the D. Itch Digger Co., to William Z. Williams, Swamporia, Fla.:

Dear William:

A dredge is the only practicable method of handling the job you describe. There are any number of reasons against trying to run a power shovel right into the water. For one, an enclosed cab, unless quite small, might be sufficient to float the shovel, or make it so light that it would be unmanageable. And special bearings, special engine, special almost everything would be required.

Our Florida representatives, the Miamiami Construction Co., Miami, have a small dredge which they are not using. Also they have a few land power shovels in stock in ½ and ¾-yard sizes. Why not take a run to Miami, and talk over your difficulties with them; let them suggest the proper excavation method in this case?

• "Landmarks put it in the ocean."



• "But I haven't found any treasure."

Tell me more about your treasure hunt itself. What reason do you have for believing it to be buried there? Frankly, Williams, the whole thing sounds a bit doubtful to me, a rather desperate venture into which to sink the last of your capital. Of course if the luck you've had thus far holds, you'll probably catch a sea-serpent which will have diamond studded teeth or something. But you can't count on that luck you've been having lasting forever. Better forget this buried treasure.

D. Itch

Letter from William Z. Williams, Swamporia, Fla., to D. Itch, President, The D. Itch Digger Co., Circle Center, Ohio:

Dear Mr. Itch:

Well, I saw the Miamiami Co. officials yesterday and bought a power shovel; but I didn't tell them what I wanted to use it for because, Mr. Itch, this whole affair is a deep secret. I'll tell you all about it.

Down here in Swamporia, which isn't a town, really, but just a big vacant area of land along the sea-shore that nobody has ever done anything with except that there are a few shacks a mile away that they call a town, I met a very romantic-looking old sea captain. His name is Kydd.

When we got friendly, he told me that he knew of a treasure, in gold, buried about a hundred feet out in the ocean, under twenty feet of water. He's sworn to secrecy about how it got there, but I imagine that the coast-line has changed and that somebody buried it there. He has a map, and on the map it shows up as being on land, although the distance from certain landmarks puts it out in the ocean.

He told me about it when he learned about my many experiences with power shovels, and offered to divide half-and-half if I could make some arrangement to raise it. He didn't know how.

But he's certain about the treasure being there and it does look like a wonderful gamble. And I need the money.

I've come to the conclusion that you are right about the enclosed cab, but that doesn't reconcile me to using anything so awkward as a dredge. Instead I've purchased a shallow-water diving suit, one of the kind that works with an attached oxygen tank instead of someone having to pump air down to you.

And without telling him what I was going to use it for, I had one of the Miamiami engineers fix up the shovel so it will work under water. It is electric, and I made him attach large storage batteries, and enclose the motor and all working parts, arrange for oxygen supply, and everything. He says it's never been done before, but he's quite an inventive type of guy and thinks it will work--for a while anyway. But they look at me rather strangely at the Miamiami plant.

Sincerely yours,
William Z. Williams

Telegram from D. Itch, President, The D. Itch Digger Co., Circle Center, Ohio, to William Z. Williams, Swamporia, Fla.:

IS THIS A GAG QUESTION MARK I TOLD YOU YOU WERE SO LUCKY THAT IF YOU WENT AFTER A NONEXISTENT TREASURE YOUD CATCH A SEA SERPENT WITH DIAMOND STUDDED TEETH OR SOMETHING STOP AM I A PROPHET QUESTION MARK HERE I READ IN THE MORNING PAPER THAT A SEA SERPENT HAS BEEN

• **"When I raised the dipper—well, I guess it may have looked like anything in the moonlight."**

REPORTED SEEN LAST NIGHT OFF THE COAST NEAR SWAMPORIA EXCLAMATION POINT STOP WHEN YOU CAPTURE IT LET ME KNOW AND ILL MAKE YOU AN OFFER STOP MY PET GOLDFISH IS LONESOME

D. ITCH

Telegram from William Z. Williams, Swamporia, Fla., to D. Itch, President, the D. Itch Digger Co., Circle Center, Ohio:

IN SPITE OF WHAT SEEMS TO BE SARCASTIC TONE OF YOUR TELEGRAM I WIRE TO REASSURE YOU THAT EVERYTHING IS OKAY DONT WORRY LETTER FOLLOWS

WILLIAMS

Letter from William Z. Williams, Swamporia, Fla., to D. Itch, President, The D. Itch Digger Co., Circle Center, Ohio:

Dear Mr. Itch:

In spite of the optimistic tone of my telegram, everything is not going as smoothly as I hoped. For one thing, I've got to find the treasure now, or else. I've got only a couple of dollars left.

You see, just to play safe that we wouldn't be bothered and that there would be no disputing of claims about the treasure if I found it, I bought up all the ocean-front land near Swamporia, several miles of it. Nobody was using it for anything, and I got it practically for a song, but I can't sing much more even at that price.

The shovel works, but I see now why people use dredges. The shovel stirs up so much mud in the water that I can't see much anyway. In fact, I can't see at all. But I have a system. I do my digging for an hour or two at night. Then the next day I go back in my diving suit and by that time the water has cleared and I look around where I have dug for any signs of the treasure. There aren't any signs yet.

We are keeping all this very secret. The Captain stands guard on the shore while I work, to keep trespassers away from the shore, and I leave the shovel right out in the water where I'm working. And when I go out or in from the water in my diving suit, I've discovered some rocks I can get behind, a couple of hundred yards down, so nobody can see me. And I hide the suit there.

But now about this sea serpent. There isn't any sea serpent around here that I know of thus far. What happened is this. Last night a couple of lovers had strolled down to the shore from somewhere and the Captain didn't see them. In digging, I happened to raise the shovel dipper out of the water, and when they saw that dipper sticking up a hundred yards from shore--well, I guess in the moonlight it might have looked liked anything. And now there are a million rumors going around about sea serpents, and we're going to have a lot of trouble to keep things safely secret.

If I don't find the treasure within a few days, I'll be hitch-hiking to Circle Center, I guess, to see you about a job. Do you need a good supersalesman?

Sincerely yours,
William

Telegram from D. Itch, President, The D. Itch Digger Company, Circle Center, Ohio, to William Z. Williams, Swamporia, Fla.:

WHERE DO YOU GET THIS DIPPER STUFF TO EXPLAIN THE SEA SERPENT QUESTION MARK TODAYS PAPERS CARRY HEADLINES THAT HUNDREDS OF PEOPLE HAVE SEEN SEA SERPENT NEAR SWAMPORIA IN BROAD DAY-

• **"So I made a real serpent's head out of the dipper."**

LIGHT AND THAT IT CAME IN NEAR TO SHORE AND THEY COULD SEE ITS FEATURES EYES EARS AND TEETH AND SCALES STOP HAVE YOU SENSE ENOUGH TO GET THE H OUT OF THERE BEFORE SOMETHING HAPPENS TO YOU OR MUST I COME DOWN THERE TO DRAG YOU OUT BEFORE YOU GET KILLED STOP THERE ARENT ANY SEA SERPENTS BUT IF THERE ARE THEY ARE DANGEROUS AND DONT MESS WITH THEM STOP BESIDES I READ ELSEWHERE IN THE PAPER THAT THE SEARCH IS STILL GOING ON FOR AN ESCAPED LUNATIC WHO THINKS HIMSELF TO BE CAPTAIN KIDD AND THAT CLUES POINT TOWARD FLORIDA STOP WE NEED SOMEONE HERE TO WRAP UP SHOVELS FOR MAILING

D. ITCH

Letter from William Z. Williams, Swamporia, Fla., to D. Itch, President, the D. Itch Digger Company, Circle Center, Ohio:

Dear Mr. Itch:

Thanks very much for your offer of a job wrapping shovels for mailing; but it is news to me that you wrapped them. And don't you have to ship them by freight? All the ones I ordered from you at one time and another came that way.

But I don't need the job. I have plenty of money now-more than I started with by quite a bit, even though I guess maybe you were right about the treasure. Anyway, I didn't find it. But the Captain's name is Kydd and not Kidd, even though he did once intimate that he was under an assumed name because a certain great secret organization was after him trying to kill him, and said something about a black spot that I didn't understand. But I don't think he's crazy, even though his map is wrong about the treasure.

And would anyone wanting to hide, and thinking his name was Kidd, make so slight a change as to change it to Kydd? No--he'd probably call himself Glockenspiegel or O'Harrigan.

Anyway, it was a stroke of genius on his part that let us out of this affair with flying colors and money in the bank, and if he is crazy, so am I.

Now about the sea serpent, which seemed to excite you quite a bit, although I don't know why, for you were the first one to bring up sea serpents in connection with the treasure so you should be the least excited about it, especially because there wasn't any sea serpent anyway, but if there hadn't been, we would have lost all my money.

You see, because of those first reports that got into the newspapers, it seemed that everybody got curious and started to come down to our beach to watch for the sea serpent which that pair of lovers thought they saw. They came in droves and they came in trailers and brought camping equipment, and there were so many of them that the Captain couldn't keep them off our property, because our property was the only property they could see the sea from for several miles.

And then I got my idea that night. Maybe if they got a good look at a real sea serpent it would scare them away, and we could go on with our work. So that night I got into my suit and I drove the shovel a mile down the beach and brought it out of the water, and I took some canvas and paint and I made a real sea serpent's head out of the dipper and rigged it up so when I tripped the dipper, the mouth would open and show a lot of teeth.

Close up, it didn't look like much, but fifty yards or more away it was something to give you nightmares if you saw it coming up from the water.

So I put on my diving suit and drove it back where we had been working, and stuck the dipper scoop up out of the water and opened the mouth, and then I ducked it under, and went in a bit closer to shore and did it again. I couldn't tell what was happening on the beach, of course, but I could imagine.

Then I drove the shovel back away again, in case any darned fools should go out with harpoons or something to hunt for it, and left the shovel hidden under water a mile down the beach and came out.

I figured that that would scare all the saps away, and that we could go on with our digging. And then, being tired out, I went to our shack and went to sleep. It wasn't until night that I saw the Captain again.

He walked in and started emptying his pockets on the table, and my eyes started to bulge. There was over a thousand dollars in bills of small denominations.

He winked at me. "That's the start!" he said. "They've been coming in droves; driving all the way from Miami, from Jacksonville, from Tampa. I sent for a carload of Pinkerton men to guard our boundaries and I've been charging them admission."

I just gulped.

"The advance man of a Carnival that's coming there tomorrow to capitalize the rush has offered us ten per cent of the gross for a week's stand! With a crowd like that, they'll make a fortune and so will we. That'll run into thousands!"

Well, Mr. Itch, we talked it over and decided to let well enough alone and leave the shovel where it is, safely hidden under water a mile away. And we went out and buried the diving suit.

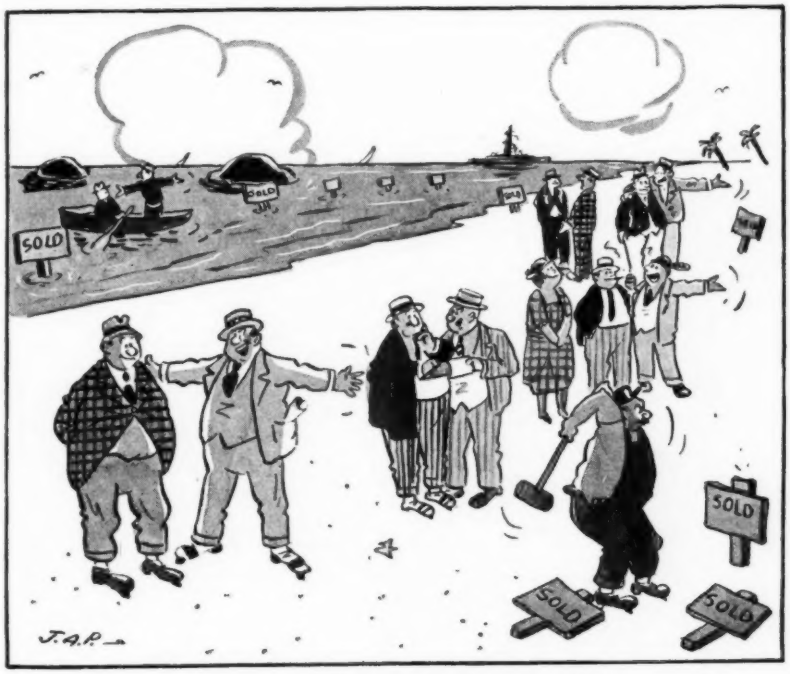
So you see, Mr. Itch, everything would have turned out quite profitably even if the real estate men from Miami hadn't made the deal they did with us for the land, and sub-divided and sold it while they had such a crowd of prospects.

So, Mr. Itch, if you think that Mr. Kydd is crazy, let me know if you know the addresses of any good sanitariums; I'll look them up the next time I need to make money in a hurry.

So, as I said before, I won't need, after all, to come to Circle Center to take a job wrapping shovels. And since my Florida vacation has turned out so profitably, I'm thinking of vacationing a bit longer. Maybe I'll run across to Africa; I've always had a yen to see some genuine wild safaris and treks in their native forests. And if I run into any excavation jobs, I'll keep the D. Itch shovels in mind.

Sincerely yours,

WILLIAM Z. WILLIAMS



• "The real estate men subdivided and sold it."

Everglades **Highway**

Badgett Construction Company draglines build 14-mile section of new highway from South Bay to Fort Lauderdale, Florida.

By L. H. HOUCK

THE Florida Everglades have always been a region of mystery, and tales are told of the old days when pirate ships, laden with gold and pieces of eight, eluded pursuing vessels by taking refuge in the treacherous Everglades. While it is a far cry from these old yarns to the modern job of putting an up-to-date highway through these same Everglades, much of the old romance still clings to the region, and any task connected with.

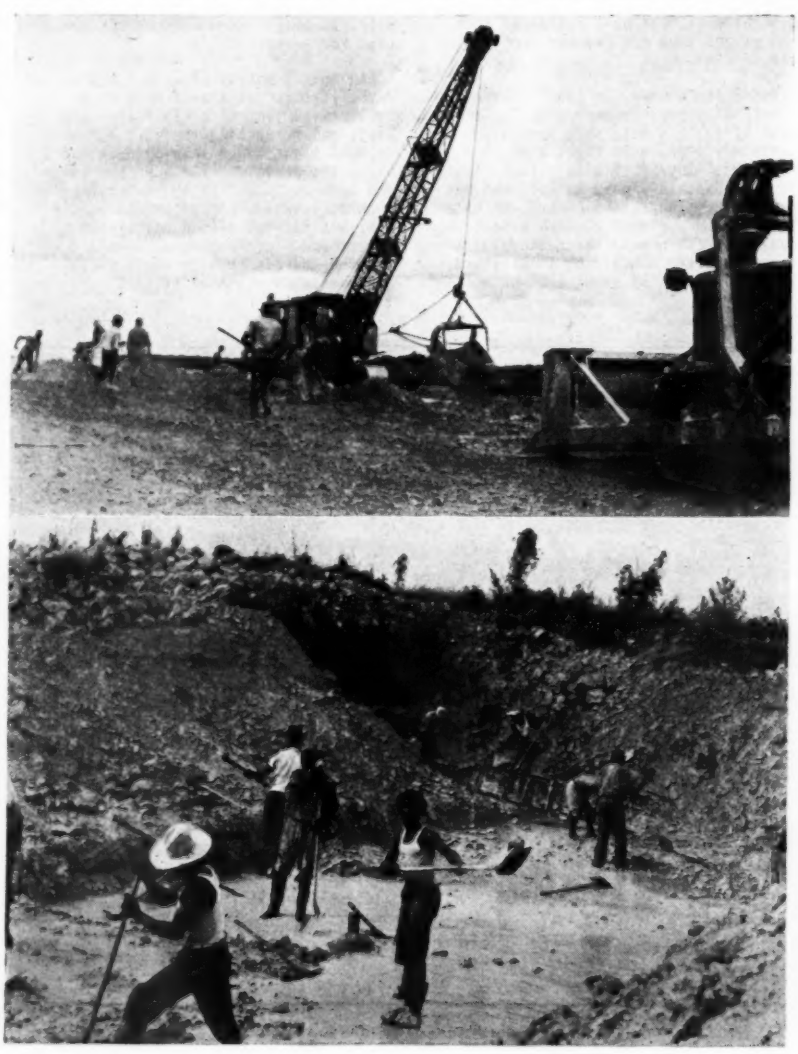
Even today, many regions of this great swamp area, stretching 150 miles north and south and 100 miles east and west, remain comparatively unexplored. Only recently have accurate maps been made of the region, and the picturesque animal and vegetable life present many problems to the road-builder.

Through this country, which is neither land nor water, the Badgett Construction Co., of Memphis, Tenn., is building 14 miles of road along the banks of the New River Canal. The total road runs from Fort Lauderdale, to South Bay, and is divided into several sections, some still unlet. The northernmost contract on this road, described in the October Excavating Engineer, is being constructed by Geo. D. Auchter.

The contract for the south end of the federal aid road through the Florida Everglades from South Bay on the south bank of Lake Okechobee to Fort Lauderdale, was let to the Badgett Construction Co. in January, 1937. The total bid was $319,000 and was for approximately 14 miles of road and some 800,000 yards of excavation, most of it under water. Road is to be 30 feet wide.

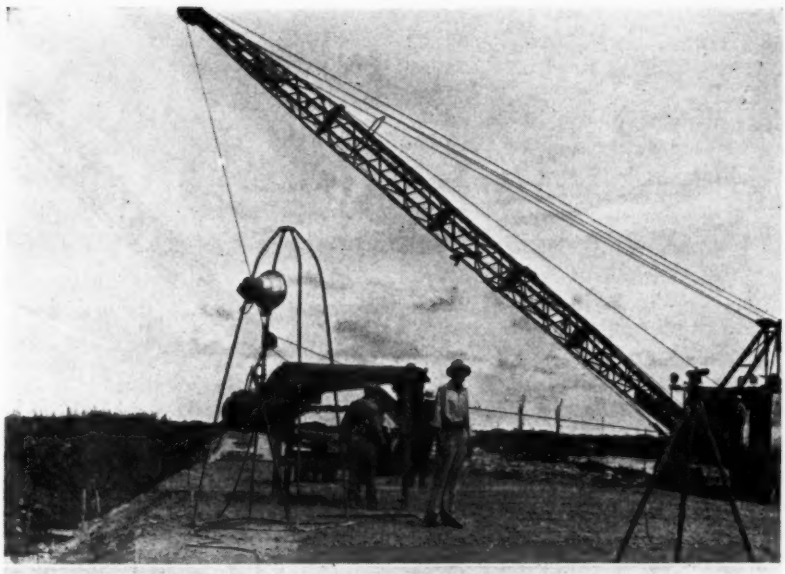
Badgett moved two Bucyrus-Erie draglines, a 43-B and 46-B, and auxiliary equipment in on the job January 21, 1937 and has been running on a 24-hour a day basis, six days a week, ever since, with a crew of about 100 men.

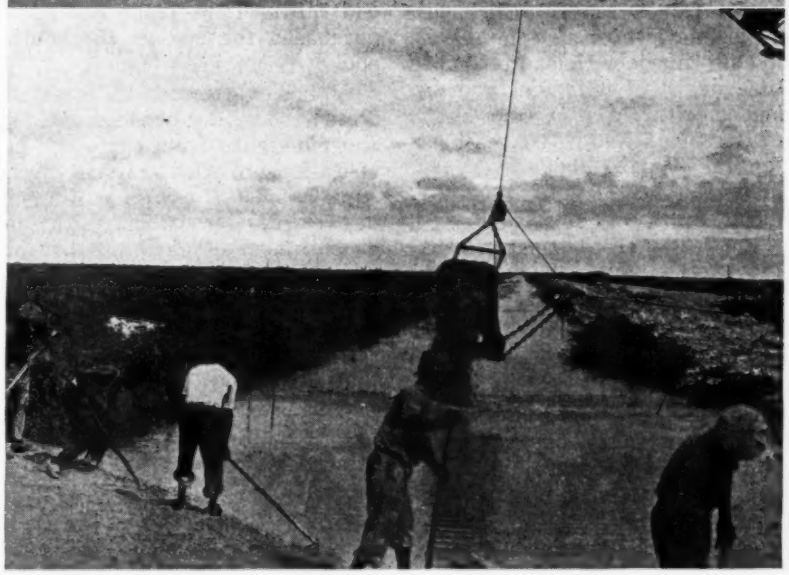
Road building in the Florida Everglades has never been easy and this road calls for rock on rock construction. The overburden of muck must be removed from the road bed down to solid rock which means from a foot to eight feet of excavation. The road is then to be built up to grade on this foundation from rock to be



Top: General operating view at south section of the Badgett contract. Fill is graded by bulldozer and by hand. Bottom: Several culverts and small bridges are part of the contract. This crew is clearing up for a culvert on the north section.

● Top: General operating view at the north section of the Badgett contract. The portable light-stands were built from pipe on the job, and can be moved by one man. General superintendent Marvin Leath is standing by the light. Center: portable gas and electric welding outfits handle repairs. This is a P & H 200-amp. Smooth-arc. Bottom: North limits of the job. This canal extends north and rock from it is used for fill on the G. D. Auchter job 50 miles away, as well as on the two Badgett sections.



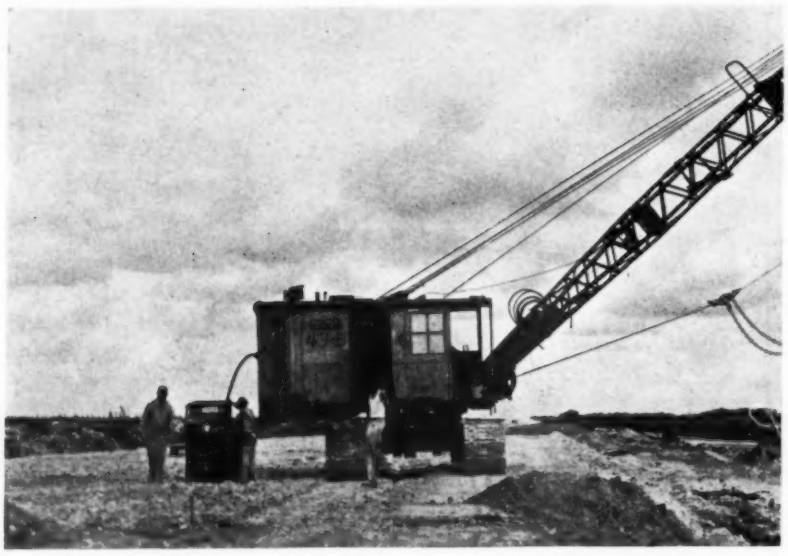


excavated from the bottom of the canal which flows along side of the roadbed.

To add to the natural difficulties the work was split up into two sections with 14 miles intervening, in which a four-mile contract was let, to Boone and Wester of Fort Lauderdale, Fla. Consequently the Badgett Company had to work both ends of their contract at the same time and maintain two crews. They sent the Bucyrus-Erie 46-B dragline to the north section and kept the 43-B on the south. To provide a means of reaching the northern end of the contract, and so supplies could be sent in by land, instead of boat, the Badgett Company took their Caterpillar tractor equipped with a LeTourneau bulldozer and knocked the humps off the canal bank and used it for a road to the northern end of their job. Even so most of the crew on the north end have been hemmed in for six months. A complete camp with eating and sleeping facilities was built for their accommodation.

The northern end of the project is 39 miles from Fort Lauderdale and about 20 miles from the nearest highway. On this section, the general superintendent is Marvin Leath and the job is to clear eight miles of road bed to the solid rock, dig out the canal and build the road. A Bucyrus-Erie 46-B dragline equipped with a 70 foot boom and a 2-yard bucket, was put to work excavating the rock which had been blasted from the bottom of the canal. It is estimated that the excavation in this section will run to more than 404,000 yards.

A space of about sixty feet is left between the road bed and the



● Ray James, superintendent—at extreme left, supervises refueling of the 43-B.

canal and in this space the 46-B works. The six and one-half tons working weight is kept on top of the ground by a mat made of 3x6 Florida pine.

Digging is proving to be a difficult proposition because the water is running about 13½ feet deep. The hard rock bottom is inclined to become soft and powdery after shooting, with the result that a great deal of each bucket load runs back in the form of a fine sand. Consequently, at each swing the bucket dumps only about half its capacity.

A drill barge operates about three-quarters of a mile ahead of the 46-B. It drills a series of holes across the bottom of the canal. Two Gardner-Denver drills, with a Gardner-Denver air compressor, handle this job. Holes are drilled to a depth of nine feet and are loaded with three or four sticks of Hercules Gelamite No. 1. Shooting takes place about every six hours.

Dynamite is stored in small houses along the finished road and the little buildings are equipped with 2x6's nailed across the ends so they may be carried to new locations. The dynamite is sent to the drills about one box at a time.

After the canal bottom has been cleaned off, it has a depth of about 16 to 17 feet. Several culverts and small bridges must be excavated for on this end of the contract and a Crouch 18-inch pump powered by an Allis-Chalmers engine is used to keep the excavations dry enough for hand labor to work.

A 7-inch pump of the same type is used to move the water out of the roadbed after the muck has been excavated, so inspectors can see the rock bottom before O.K.-ing a section.

Electric lighting equipment on the north end of the job is furnished by a 5 KW. one cylinder Stover Diesel plant and a Kohler rig on the dragline. The stands for the ground searchlights are made of pipe and are light in weight so they may be easily moved about. They were fabricated and welded on the job. A second Stover light plant has been purchased for use on the south end.

Living quarters and a common dining room have been provided a short distance from the scene of operations. Work is carried on in eight hour shifts, three shifts per day, six days per week. With the exception of a small number of men who come out in a truck every day, the entire crew live on the job.

Welding is taken care of by a P&H Smootharc 200 amp. welder and a gas outfit. The electric welding generator is driven by a small Wisconsin air-cooled gasoline motor.

On the South End of the Badgett contract, which begins at what is called "Twenty Mile Bend" out of Fort Lauderdale, Roy James is superintendent and Reese James is foreman. The excavating is done by a 43-B Bucyrus-Erie dragline which also saw yeoman service on the Badgett Atlantic-Gulf ship canal contract.

The new highway leaves Fort Lauderdale as State Route No. 26, which is a little used road. A section of the road from Opeelanta extending about three miles toward Fort Lauderdale has been completed by the Spadaro Construction Co., of Moore Haven, Fla. Their contract amounted to about $100,000.

The South section of the Badgett contract is a job of clearing the road bed of muck down to the rock, for a distance of 6 miles. The canal bank here consists mostly of white rock which will be used to build up the new roadbed. This is probably the only dry digging on the entire road. Total excavation on this section will be about 400,000 yards.

The 43-B is the only dragline on this end of the work and it has a 50 foot boom and a 2-yard bucket. The rock is a closely packed combination of limestone, marl and coral, and part of it has been packed down in an old road. All this is hard digging in which the 43-B moves about a thousand yards per eight hour shift. No blasting is done and no provision has been made for it as yet on this part of the road.

The remainder of the work is done with a Caterpillar RD-8, equipped with a LeTourneau bulldozer which levels out the fill. The road is then finished by the ground crew with shovels and rakes.

G. W. Abbott is the state inspector on this end. Completion of the road is scheduled for January, 1938.

No contracts for surfacing have been let, according to road officials and no decision has been made as to the kind of top to be required. The foundation of the completed road will be such that most any type can be successfully applied.

CITY PARK

Kenosha Department of Parks and City Planning combines modern equipment and relief labor in developing new recreation center

WITH 6,800 feet of beach frontage on Lake Michigan, with three "homemade" lagoons and a natural river, with 23,800 feet of walks and bridal paths, 155-acre Alford Park will provide a fine outdoor recreation center for the citizens of Kenosha, Wisconsin.

Excavation and grading for the new development are well under way, and work will be continued through the winter in order to finish the project by next July 1st. The job is being financed by a $758,000 WPA allotment, supplemented by $98,000 supplied by the city. Supervision is provided by the Department of Parks and City Planning, Floyd A. Carlson, Director.

Park layout was designed by Mr. Carlson; Phil Larson, Landscape Architect; and Hugo Bothe, Engineer. These men, together with Superintendent Larry Gallagher, are directing the work.

For descriptive purposes, the work at Alford Park, located on Highway 42 at the north limits of Kenosha, may be divided into four phases: river-bank grading; lagoon construction; beach improvement; and walk and road building.

Work on grading the river bank is being handled at present by two shifts of relief labor, and a 3½-yard Bucyrus-Erie 2-wheel scraper pulled by an International T-40 TracTracTor. The scraper is digging black top soil from Highway 42 down to the river, and stockpiling it. Sand from the beach is hauled in to fill the area to a smooth grade, and the black soil is pulled back over the fill, with the crew of men doing the final grading. The graded strip will be seeded in the Spring.

Although the new scraper had been in operation only a short time when we visited the job, it had already been given a special name descriptive of its operating appearance by the park department forces. They call it the "Tumblebug." Operating on a 500-foot haul, the scraper has averaged between 300 and 400 yards per 8-hour shift in clay and muck. Fuel consumption has run about 20 gallons of Diesel oil per day.

As soon as the present grading work is cleaned up, the scraper will be moved to the east side of Highway 42, where it will excavate for the three lagoons. A total of 52,300 yards must be moved in constructing these lagoons, and the "Tumblebug" is slated to handle 28,000 yards of this total. Maximum haul on this part of the work will be 5,000 feet, and average haul will run 3,200 feet. Excavated dirt will be used for necessary fill in other parts of the park. Up to 9 feet of fill is required in some places.

The digging not suitable for scraper handling will be taken care of by dragline; some of the dirt being spoiled for later scraper handling and hand grading.

Hauling equipment now set up at the lagoon site includes a 7-ton gasoline locomotive and 20 dump cars of 1¼-cubic yard capacity.

(Continued on page 698)

• Grading from Highway 42 to the river at Alford Park is handled as shown here. The scraper stockpiles top soil, a sand fill is put in, and the WPA crew backfills and grades. Completed section is shown at left.

EXCAVATING ENGINEER

A Monthly Publication
Devoted to the Excavating Industry

The Excavating Engineer Publishing Co.
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Teamwork and Touchdowns

Teamwork brings in the profits on an excavating job just as it brings in the touchdowns on the football field. Real teamwork is based on the skillful handling of a multitude of details. For instance, your shovel is a digging and not a transporting machine, and consequently your operation clicks for more "scores" when digging time most nearly approaches total operating time. Theoretically, this is obvious; practically, it is easy to miss little waste motions which seem insignificant in themselves, but have a very appreciable effect on output over a day, week or month.

Last month we discussed the importance of one aspect of time saving — reducing swing time. There are many other factors, of course. We recently saw a large cellar job where two shovels "in the hole" were loading to trucks on the surface level. Each machine was dumping at the top of its reach. The working area in this case was large enough so a ramp could have been built into the excavation, and the trucks run down to the shovels' level for loading. This method of cutting down the hoist height, while it would have increased truck gas consumption, would have reduced shovel power consumption and materially increased output. The result would have been well worth the extra time needed to put in the ramp and run the trucks down and up it.

Again, a quarry operator was running empty trucks opposite the loading shovel, turning and backing into position—an operation requiring considerable maneuvering time and a shift of gears. Then the superintendent got the idea of running the trucks past the shovel where there was space for a full circle turn, and coming back into loading position "heading out." When tried, the new plan saved time and reduced truck gas consumption.

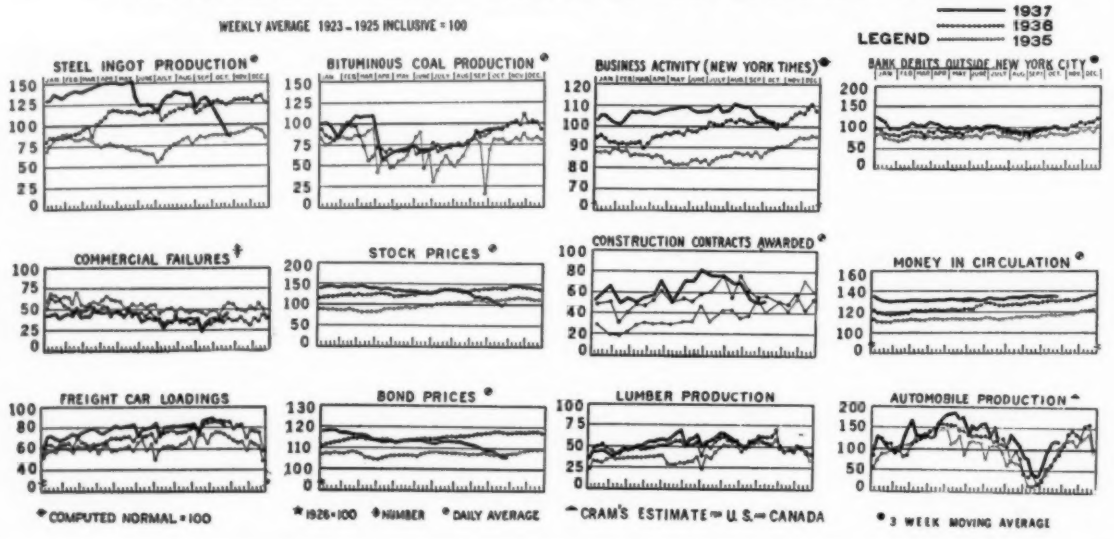
The importance of these examples is the indication they give of the profit possibilities time and motion studies offer on most jobs. One large open pit mine operator employs a "checker" 24 hours a day on each of his big strippers. After a period of operating under this system, he ran a test without a checker. Output dropped from 10 to 15 per cent—and the checkers were in to stay. These men chart every swing and the cause of every delay, no matter how slight. With dipper capacities running up to 32 cubic yards, if the checker can add one digging circle per shift, he has more than paid his wages.

Although this is a large-scale, permanent operation where time and motion studies are obviously important, the lesson it teaches is just as applicable to most small jobs. Comparing an excavating organization to a football team once more, the success of each is directly dependent on the skill with which all parts of the "game" are coordinated. Laying out a digging job is similar to giving a football team the plays which will bring touchdowns. If you make thorough time and motion studies, you have the best basis for laying out your job in the way that will bring the biggest profits.

Moderately Reduced Construction Predicted for 1938

Privately financed building and engineering work in 1938 should approximate the same volume as this year, according to Thomas S. Holden, vice president of F. W. Dodge Corporation, in a statement on the construction outlook made public today. However, publicly financed work is likely to continue its decline, resulting in a modera-

WEEKLY BUSINESS INDICATORS



tely reduced total volume of construction next year.

The Dodge estimates indicate that 210,000 to 220,000 new family dwelling units are likely to be built in the entire country next year, compared with an estimated 185,000 to 195,000 in 1937, and 160,000 in 1936. This moderate increase in residential building is likely to be accompanied by a volume of commercial building approximately the same as this year's, and declining volume of factories and public and institutional buildings. While combined moderate increases in residential building and moderate decreases in non-residential building would give a total building volume about equal that of 1937, heavy engineering work is also likely to decline somewhat, resulting in a net decrease in total building and engineering volume.

The current recession in building has, to date, been quite moderate in character, having consisted principally in declines in publicly financed work. Privately financed building, both residential and non-residential, continued to run ahead of last year's volume right through the middle of October. During the first nine months of 1937, private construction of all kinds in the 37 Eastern States reached a total of $1,436,994,500, which was 46 per cent ahead of the figure for the corresponding period of 1936, while public building and engineering work has declined 18 per cent from last year.

Expectations of a large and rapid boom in residential building were not justified at any time this year, nor are they justified in anticipation for next year, according to the Dodge Corporation's analysis of the situation. Estimates of housing requirements running from 500,000 to 1,000,000 family units a year represent social needs they do not represent an economic demand at the present stage of partial business recovery. They probably cannot be translated into economic demand in a period of rapidly rising costs, but will only be realized on a broad scale by such future improvements in home-financing and home-production as will definitely provide better houses at lower costs than at present.

Two important factors are customarily overlooked in most current appraisals of construction industry prospects: Urban population growth in the first half of the current decade was at the rate of 400,000 new persons annually, compared with 1,400,000 per year in the 1920's, according to estimates recently made public by the National Resources Committee. Old-fashioned speculative building booms, of the kind anticipated in predictions widely publicized during the past twelve months, have practically always been stimulated by urban and suburban population growth. The second factor is that there is at this moment no great expanding industry, like railroads and automobiles in the past, to stimulate general economic expansion on a broad front and generate the greatly increased purchasing power necessary for a big building boom on rising construction costs. Careful appraisal of the current rises in business and building volume indicates a period of recovery from depression, but not necessarily, as yet, a period of general industrial expansion.

Next year, as viewed by Holden, will probably be neither one of serious recession nor of very rapid recovery progress, almost certainly, not a boom year. It will most likely prove to be a year of consolidating and stabilizing recovery gains, with a slow start in the first quarter, and the probability of definite improvement somewhere around the middle of the year.

● The "young" man pictured above is H. E. "Doc" Ward, who is operating a shovel for the Inter-State Iron Company in its Grant Mine at Buhl, Minnesota. "Doc" has been in the shovel game for over 40 years. He's not telling his age, but we'd judge from the picture that he started operating very early in life.

John Charlton Alexander

Thousands of readers, particularly those in New England and Middle Atlantic states, were shocked to learn of the sudden death in Boston on October 22nd of John Charlton Alexander, 46, Eastern Sales Manager of Bucyrus-Erie Company.

Mr. Alexander, or "Cap" as he was familiarly known to his many friends, was born in Ironton, Ohio, in February, 1892. Following his studies at Case School of Applied Science he was employed for a short time by a crane manufacturer located in Cleveland, from which position he entered the service, joining the 107th Engineers, 32nd Division. In France he was commissioned Captain and Supply Officer, and as the result of wounds received in the Front Line in October, 1918, he spent about nine months in hospitals in France and the United States.

In 1922 "Cap" Alexander joined the then Erie Steam Shovel Company sales organization, and after a brief assignment in Western Pennsylvania and Ohio, was made assistant and later manager of New England Sales. He retained the latter position after the formation of the Bucyrus-Erie Company until several years ago when he was made Eastern Sales Manager, with headquarters in New York City.

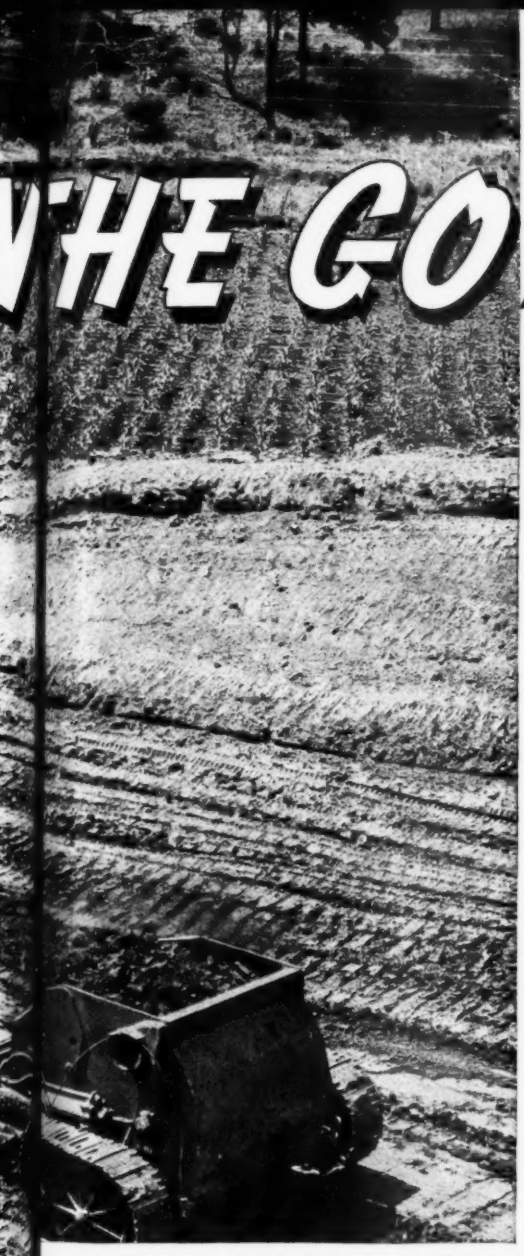
The suddenness of Mr. Alexander's passing is shown by his activities up to the time he was stricken. He left New York City the morning of the third day before his death, stopping in Connecticut on business for the day before proceeding on to Boston. The following day his illness became acute and an emergency operation was performed. Death came swiftly and without warning. Burial took place in Newton Cemetery, West Newton, Massachusetts.

Mr. Alexander is survived by his widow.

90% OF YOUR TRACTOR WORK IS DONE AT THE HIGHER SPEEDS . . . BUY TRACTORS THAT *Excel* ON THIS 90%

Allis-Chalmers tractors are designed to deliver maximum performance at the higher working speeds. These are the speeds at which you do 90% of your tractor work on the average construction job. Buy tractors for this 90% of your work . . . not for the other 10%.

ABOVE—Building spur line for railroad near Canton, Ill. In the foreground are two Model "S-O" Oil Tractors pulling Continental Scrapers on tracks. *BELOW*—Model "S-O" Tractors and 7-yard Continental Scrapers on road building jobs in Illinois and Wisconsin.



...HE GO"—haul more loads per day

The seconds you save shifting gears with an Allis-Chalmers Model "S-O" ... count up into minutes in the course of a day. These minutes mean more trips, more yardage, more profit for the Allis-Chalmers owner. With the "S-O", it is not necessary to come to a complete stop to shift gears. You shift "on the go"—like a motor truck. Only the Allis-Chalmers Model "S-O" has this time-saving feature ... a Constant Mesh Transmission with gears always in mesh. Only the Model "S-O" in its power class (64 drawbar H.P.) has 5 speeds forward—up to 6.37 miles per hour. In its size and price class, only the "S-O" has that famous Allis-Chalmers BALANCE ... which means quicker pick-up, higher working speeds, better hill-climbing, greater economy, less maintenance and superior all-'round performance. Only the "S-O" is built to BEAT the job—not stretched to meet it. Put the "S-O" to work on your job! It's the MODERN tractor for modern requirements. Ask the A-C Dealer!

RACTOR WEIGHT SAVED MEANS EXTRA PAYLOAD GAINED

ALLIS-CHALMERS
TRACTOR DIVISION—MILWAUKEE, U. S. A.

Controlled Ignition **OIL TRACTORS**
Timed Right to Fire at the Right Time

CITY PARK

(*Continued from page 693*)

These units operate over 3,800 linear feet of 24-gauge, 20-pound track. Truck haul is also used on various phases of the job.

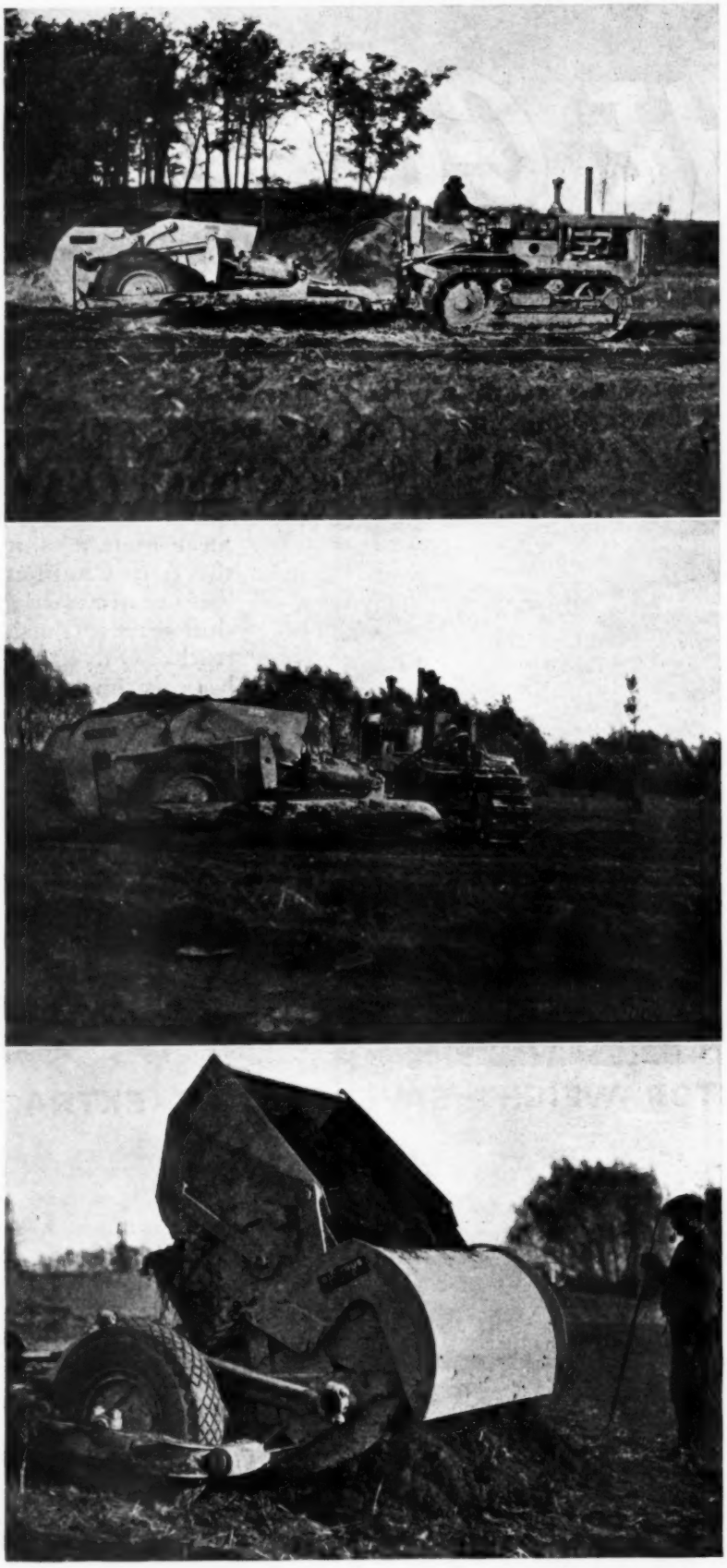
The third major phase of this park development project, beach improvement, is going on simultaneously with the excavating. A 1-yard P & H crane is at present placing stone in a series of jetties designed to protect and build up the beach. Also on the lake front is the sand and gravel plant ran by the Department of Parks and City Planning for furnishing concrete for roads and bridge structures.

In building the 5,800 feet of new park roads it is necessary to construct several bridges, one of them a 25-ton, reinforced rigid-type vehicle bridge. Other structures which are part of the job include three modern comfort stations and a 165 by 53 foot warehouse and service building.

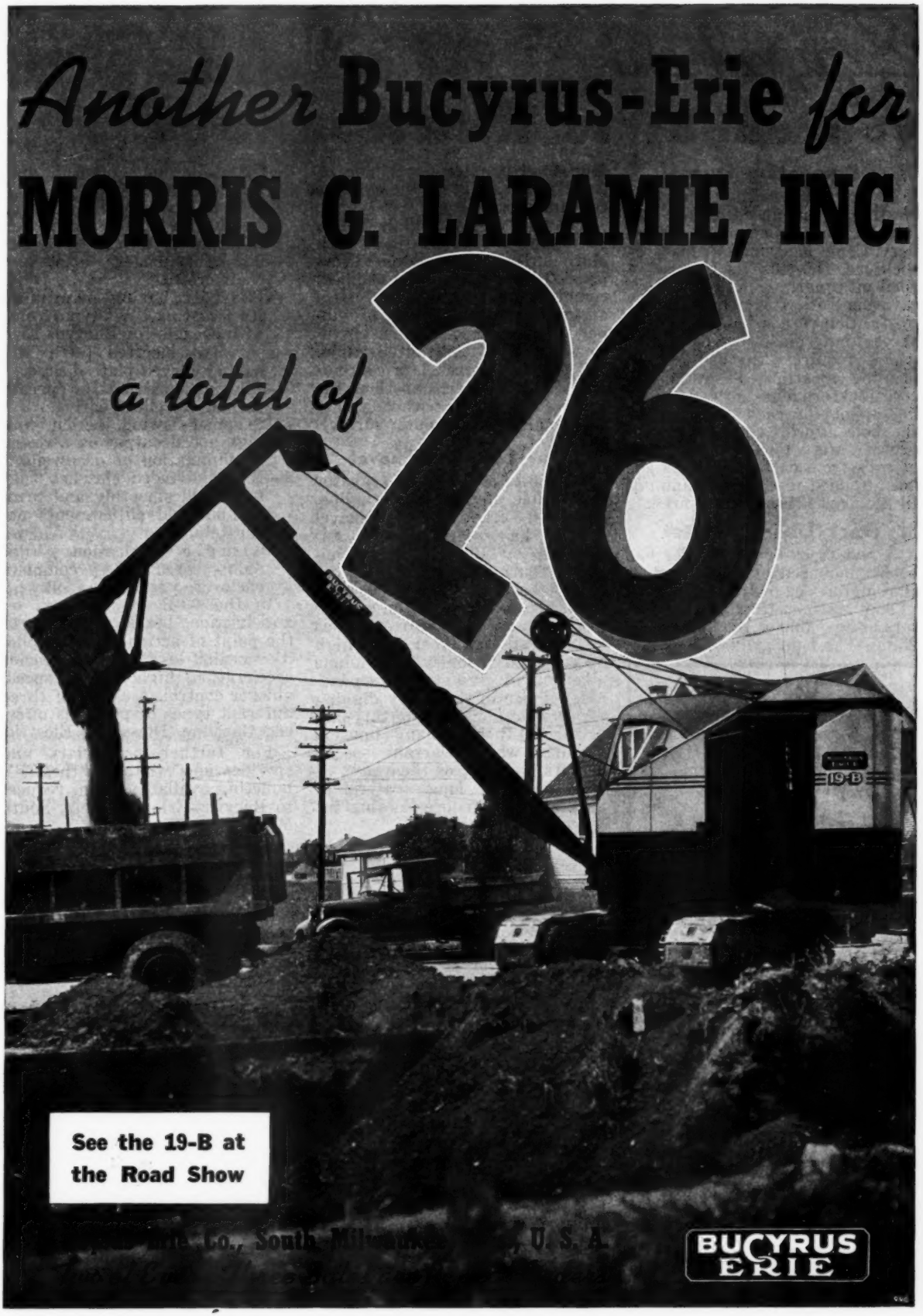
Walks and bridal paths, 23,800 feet of them, will be built by the TracTracTor and scraper, which have, in all, 760,000 square feet of grading to do. This unit is operated two shifts, corresponding to those worked by the relief labor. A relief operator works one shift, and William Laurent, a regular city employee, the other. Each operator is made responsible for greasing tractor and scraper at the end of his shift.

The Department of Parks and City Planning is providing modern equipment and skilled supervision so that the city of Kenosha may get the maximum in lasting benefit from relief appropriations, and keeping the equipment in A-1 shape is a regular part of the job. Every Saturday is special maintenance day when all equipment is thoroughly checked and serviced.

When the present work on Alford Park is completed, the equipment will probably be set to work on some of the other parks in the fine Kenosha system.



• On a 500-foot haul, this International TracTracTor and 3½-yd. Bucyrus-Erie scraper average close to 400 yards per 8-hour day. From top to bottom, pictures show digging, carrying and dumping.



For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.

Equipment
you ought to KNOW ABOUT

Detonating Fuse

A new detonating fuse for blasting is announced by The Ensign-Bickford Company, Simsbury, Conn. Known as Primacord-Bickford, this fuse is for use in open pit, quarry, and general excavating work. It cannot be set off by friction, fire or any ordinary shock, but must be detonated which requires the use of the blasting cap attached to it. Primacord-Bickford acts as the detonating agent for each cartridge in the hole affording a large measure of safety by the elimination of caps from each load. Caps are not attached to the main line until the blast is ready to be fired.

Track Laying Tractor

A new track-laying tractor has been announced by the Marmon-Herrington Co., of Indianapolis.

The Marmon-Herrington tractors are capable of road speeds of 25 miles an hour and better. From four to five miles per gallon of gasoline is said to be the average consumption.

The new tractor utilizes the B. F. Goodrich type of track with Marmon-Herrington patented suspension. The track it is claimed, combines the strength of steel and the cushioning effect of rubber to allow smooth, quiet operation free of clatter and vibration.

The special track is a continuous band of rubber, smooth on the inner surface and with adequate traction lugs on the outer surface.

New 1¼-Yard Shovel

The 33-B, a 1¼-yard excavator convertible for shovel, dragline, clamshell, crane, or dragshovel service has recently been announced by Bucyrus-Erie Company, South Milwaukee, Wisconsin. Modern alloy steels and welded construction have been used to produce a machine that combines smooth working operation, high speed, high mobility, and ample strength to give steady, dependable service in the heavy digging expected of a machine of this size.

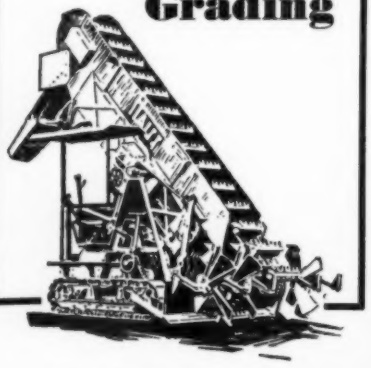
The 33-B has many unusual features which warrant special attention. A few of them are:

1—Unusually long caterpillar frames to reduce "nosing in" when digging.
2—Caterpillar side frames of unit steel castings.
3—Welded box-girder boom, light weight for speed, strong for endurance.
4—Powerful, modern hoist and chain crowd.
5—Dipper having manganese steel casting, "V" type front, with sockets for Bucyrus-Erie patented inserted teeth and having curved plate door.
6—All high speed shafts operate on ball or roller bearings.
7—Snappier swing action and high speed output as a result of elimination of deadweight.
8—Big wide-faced clutches that take hold smoothly and firmly and hold adjustments accurately.
9—Simple lubrication. Vital points cared for by complete enclosures containing oil.

In the 33-B, power rides on anti-friction bearings direct to the point of action. This simplicity means less friction, easier acceleration, higher cycle speed, quicker control. A choice of three different types of power is offered: Gasoline, Diesel, or Electric.

For further particulars and specifications write for the 33-B bulletin, available upon request to Bucyrus-Erie Company, South Milwaukee, Wisconsin.

Shallow Grading



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Let us quote . . . see how little you pay for 2 yds. a min. capacity.

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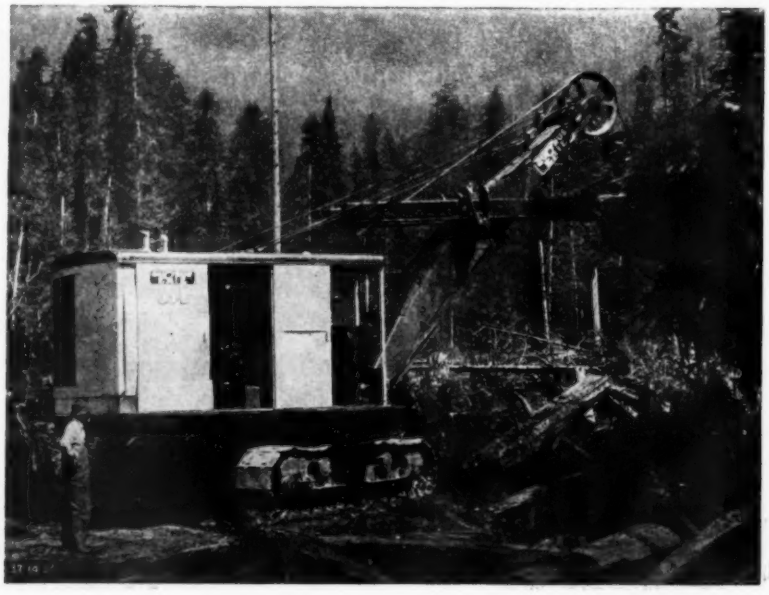
George Haiss Mfg. Co., Inc., 144th St. & Park Ave., New York
Who, for over 40 years, have created and sold none but equipment of demonstrable superiority in design and manufacture.
Bucket Loaders — Portable Conveyors



For your convenience in writing to George Haiss Mfg. Co., you will find a card bound in this issue.

1¼ YARDS TO 20 TONS

....*for fifteen years* Bay City *has used* TWIN DISC CLUTCHES *EXCLUSIVELY*

● Power shovels, cranes, draglines, trench hoes and excavators . . . 12 sizes . . . in capacities from ⅜ to 1¼ yard dipper, or 3 to 20 ton crane capacities! Bay City Shovels, Inc., makes them all! Every one of them is Twin Disc equipped!

And Bay City has used Twin Disc Clutches *exclusively* for more than fifteen years. That's maintaining a reputation for satisfactory performance.

Only Twin Disc could do it. Because Twin Disc Clutches and Power Take-Offs are strong enough and responsive enough to transmit all of the power of the engine . . . simply, efficiently and directly.

Twin Disc Power Take-Offs for gas and Diesel engines are built with clutches from single plate 7½ in. to double plate 18 in.; housings No. 5 to No. 00, S. A. E. *Write for engineering data. Specific recommendations on request.*

TWIN DISC CLUTCH COMPANY
1335 RACINE STREET RACINE, WISCONSIN

For your convenience in writing to Twin Disc Clutch Company, you will find a card bound in this issue.

Shots from the FIRING LINE

Five Star Road Show

As preparations for the biggest ARBA Convention and Road Show in history swing into the stretch, highway officials and contractors from 48 states and 25 foreign countries are making plans to attend. Over 20,000 highway-minded road builders will trek to Cleveland January 17 to 21 for this 1938 Five Star Show.

Six acres of exhibits will feature sensational new models of streamlined machinery designed to give better work at less cost. This will be the one time in 1938 when all types of highway equipment and materials can be compared under one roof and at one time.

The convention program will be as outstanding as the machinery exhibit. Highway safety, soil stabilization, gas tax diversion, highway planning and legislation, the contrast system in highway work, highway illumination, and federal aid benefits for secondary roads will be some of the subjects featured.

If you haven't made your reservations, get them in right away. Mark Egan, ARBA Housing Committee Chairman, 1604 Terminal Tower Building, Cleveland, Ohio, is the man to write to.

Bids for Completing Grand Coulee

Bids for completion of Grand Coulee Dam and power plant have been invited, and will be opened at Spokane, Washington, on December 10. This will be one of the largest construction contracts ever offered by the government. Over 7,000,000 barrels of cement and 60 trainloads of steel and machinery will be required.

Work included in the new contract will involve manufacture and placement of 5,800,000 cubic yards of concrete, more than 1,500,000 cubic yards in excess of the total volume of concrete which went into Boulder Dam. It includes placement of about 158,000,000 pounds of steel in the permanent structure, as follows: 50,000,000 pounds of reinforcement steel; 10,000,000 pounds of pipe and fittings; 50,000,000 pounds of gates and operating devices; 24,000,000 pounds of trashrack metalwork; 16,000,000 pounds of penstock metalwork; and 8,000,000 of cranes and miscellaneous metalwork. It also includes about 340,000 cubic yards of excavation.

Despite the fact that the mass of masonry to be placed under the contract greatly exceeds that which went into construction of the Great Pyramid of Egypt, the successful contractor will be allowed only 1,460 calendar days—just four years—to complete the job after he is notified by the Bureau to proceed The Great Pyramid, which stood for several thousands of years as the world's greatest structure, took the work of 100,000 men for a full generation in its construction.

Grand Coulee Dam, when completed, will have a total volume of 10,250,000 cubic yards of masonry, including that now placed in the foundation and that covered by the new contract. This exceeds greatly the volume of the Great Pyramid and of Boulder Dam combined. Boulder Dam will remain the world's highest dam, 726.4 feet against the 553 feet which Grand Coulee Dam will tower above the lowest point of its foundation, but Grand Coulee Dam will be by far the world's most massive masonry structure. Nearly $63,000,000 has already been spent on its construction.

Bidders will be required to be prepared to post a performance bond, in the event they receive the contract, of $5,000,000. Performance bonds in this sum have been required in the past only of the successful bidders for construction of Boulder Dam and of the foundation of Grand Coulee Dam. In addition they must be prepared to post a payment bond of $2,500,000, one of the largest on record. The payment bond, required under the Bacon-Davis Act is an assurance against default on labor and material bills.

Construction of the base of Grand Coulee Dam was begun in 1934 under the direction of the Bureau of Reclamation as a Public Works Administration project. The MWAK Company, the successful bidder for the original contract, made up of the Silas Mason Company, Inc., the Walsh Construction Company, and the Atkinson-Kier Company, is expected to complete the foundation dam in January of 1938, fourteen months ahead of schedule.

New Appointment for Banks

The appointment of Frank A. Banks, Construction Engineer of the Bureau of Reclamation in charge of the Grand Coulee Dam Project on the Columbia River, as the representative of the Department of Interior on the Advisory Board for the administration of the Bonneville project was recently announced.

James Delinage Ross had previously been named Administrator of the Bonneville Project. The Act establishing the Bonneville Dam administration provided for an Advisory Board to consult with the administrator and to be composed of a representative designated by the Secretary of War, a representative designated by the Secretary of Interior, a representative designated by the Federal Power Commission and a representative designated by the Secretary of Agriculture.

Mr. Banks has been in charge of Grand Coulee Dam since it was com-

● Concrete pouring at Grand Coulee has smashed all records, and the foundation dam is about completed. This night scene shows M. W. A. K. operations in the East pit.

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menced in 1934. He was born in Saco, Maine, in 1883; graduated from the University of Maine, with a degree of Bachelor of Science in Civil Engineering in 1906, and has been employed continuously by the Bureau of Reclamation, Department of Interior, since that year.

Mr. Banks is thoroughly familiar with conditions in the Pacific Northwest since he has been employed there for many years. He was Construction Engineer in charge of American Falls Dam in Idaho from 1920 to 1927, and Construction Engineer of the Owyhee Dam in Oregon from 1927 until work was begun on the Grand Coulee Dam.

Massachusetts May Lose $1,000,000 Federal Aid

Warning that Massachusetts may be penalized next year, possibly to the amount of $1,000,000 in reduced federal highway aid, is contained in a letter from Thomas H. MacDonald, chief, U. S. Bureau of Public Roads, to William F. Callahan, commissioner of public works of Massachusetts. In the closing hours of the legislature last May $6,000,000 of automotive tax funds was authorized to be transferred for use in general administrative purposes. Similar diversion of highway funds was carried out by Massachusetts in previous years.

Under the federal highway act, states practicing diversion may be subjected to penalization in the form of reduced allotments. Earlier this year New Jersey was penalized $250,000 and will lose several additional millions of dollars of federal highway aid funds if it does not stop diversion.

Pointing out that the various highway tax acts of Massachusetts specifically require that all automotive taxes be used exclusively for road financing, the letter from MacDonald to Callahan says that the state legislature has flouted the intent of the highway tax acts by diversion of funds every year since 1933.

Testing Borrow Pits at Fort Peck

Testing material to be used for the 100,000,000-yard earth fill at Fort Peck Dam has been an important phase of operations from the beginning. The U. S. Engineers have used tests to lay out borrow pits so the four giant dredges would pump exactly the right mixture into the dam.

The accompanying picture illustrates one of the testing systems. This Bucyrus-Armstrong 21-W drills 80-foot test holes, 3 inches in diameter. The rig is working in dredge borrow pits from ½ to 3 miles downstream from the dam. Practically continuous 3-inch diameter drive samples are taken, with field classification and laboratory tests for control.

Operating three 8-hour shifts 7 days a week, the drill averages 54 feet of hole per shift, has put down as high as 90 feet in 8 hours. Swinging 600 pounds of tools, the 21-W uses about 3½ gallons of gas per shift.

Hand operated drill rigs were used for this testing previously, and turned out an average of 20 feet of hole per shift, compared to 54 feet for the power rig.

Deschutes Project Approved

The President has approved the Department of Interior's finding that the Deschutes Federal Reclamation project near Madras, Oregon, is feasible.

The finding of feasibility and its approval by the President is required under Reclamation law prior to commencement of actual construction of a new project.

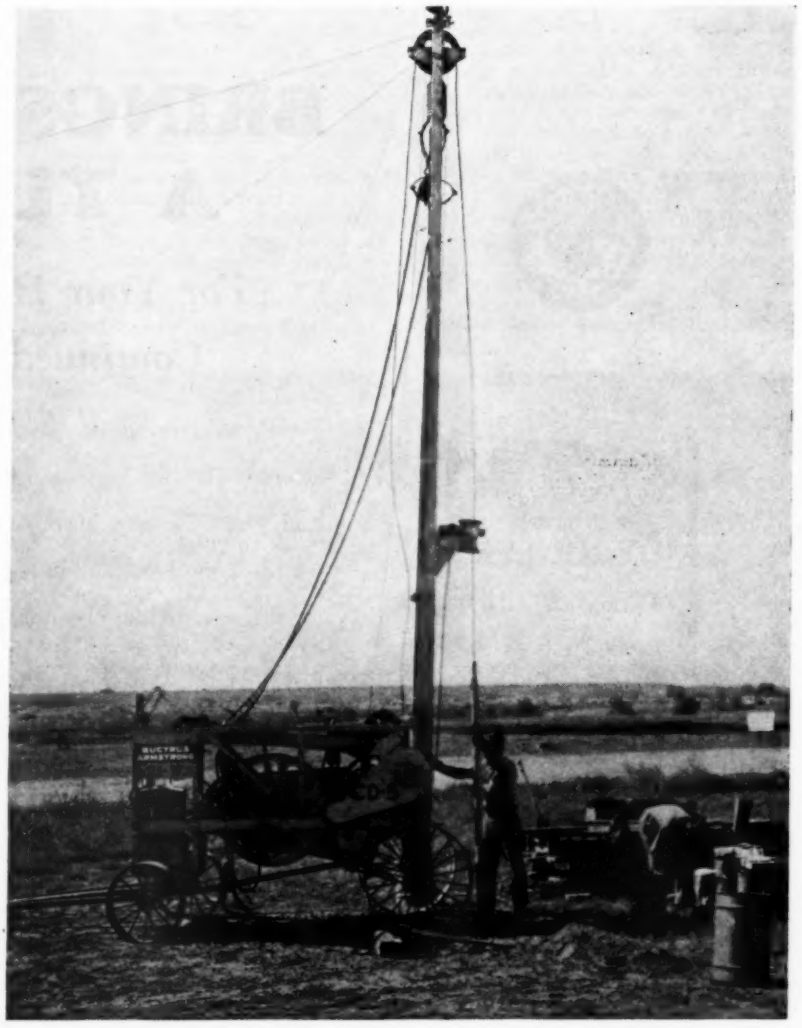
The Deschutes project was adopted by the Congress last year when an appropriation of $450,000 for commencement of its construction was included in the Appropriation Bill for the fiscal year 1937. This money was continued available for the fiscal year 1938, although no new appropriation was made this year, since the project had not yet been started.

The Deschutes project is designed to provide irrigation water for 50,000 acres of dry but fertile lands immediately north of Madras, on the east side of the Deschutes River in central Oregon. The principal engineering features of the project, as now planned, include Wickiup Dam and reservoir on the Deschutes River, designed to conserve and divert 209,000 acre-feet of water, a main canal extending from Bend, north for 65 miles, to the Agency Plains near Paxton, a steel siphon, 7,660 feet long, near Terrebonne, across the Crooked River, smaller canals and laterals and other canal structures.

The Wickiup Dam, as now proposed, would be located 40 miles above Bend and would be an earth embankment, 83 feet high and 3,100 feet long, with auxiliary dikes on either side, one 14,900 feet long, the other 3,600 feet.

The main canal would be located largely through rock cuts and would require considerable concrete and gunnite lining.

The estimated cost of the Deschutes project is $8,000,000. Work estimated to cost slightly in excess of $2,000,000 and including clearing the reservoir, which will cover 11,200 acres, and lin-



Just keeps digging along

Soft mud and bad weather doesn't slow up the Walker. On the edge of the Warrior River bank in Alabama, on ground where any other type of equipment would bog down, the Bucyrus-Monighan walking dragline maneuvers easily to move big daily yardages along the river bank. Long booms, increased bucket capacity, fast and accurate digging cycle plus the exclusive walking traction especially suits the Walker to drainage and irrigation work. Manufactured by Bucyrus-Monighan Co., Chicago, Illinois.

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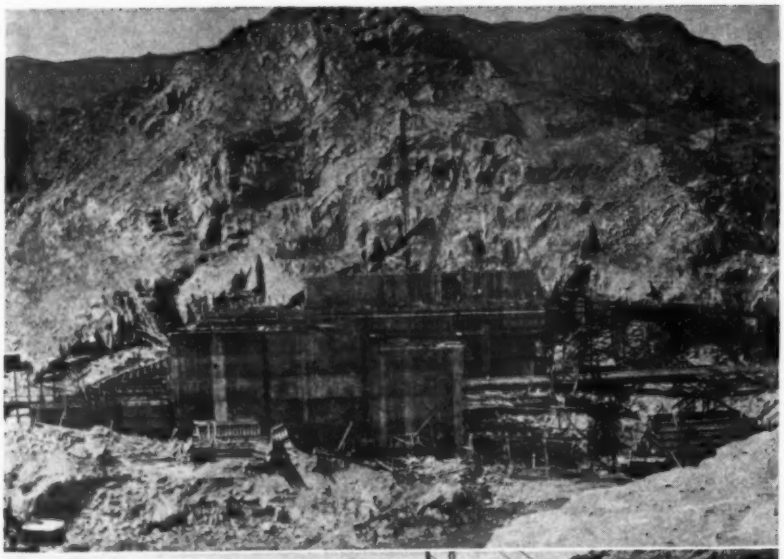

ing the canals, preparing concrete aggregates, etc., will be done by Civilian Conservation Corps men.

The remainder of the cost of the project will be repayable in 40 years by water users on the project lands.

Vallecito Dam Bids Opened

Bids for construction of Vallecito Dam, near Bayfield, Colorado, were opened on November 16 by the Bureau of Reclamation at Durango, Colorado.

The excavation to be done includes the following: 325,000 yards of stripping; 839,000 yards of common excavation for dam, to be separated; 151,000 yards common, not to be separated; 80,600 yards rock excavation for dam; 3,100,000 yards common excavation from borrow pits for dam fill; 95,000 yards rock excavation in borrow pits; and 50,000 yards excavation of all classes for cobble fill.

45,000 yards of backfill; 275,000 yards of cobble and rock fill on embankment slopes; and 126,000 yards of riprap will be required.

Flood at Bartlett Dam

By LEAL DAG VAR

With giant power and reclamation projects, man is shaping nature to meet his needs, but nature does not always take the shaping without a fuss. One such "revolt" occurred during the past summer at Bartlett Dam in Arizona, under construction by Barrett, Hilp and Macco.

For several days early in July the waters of the unruly Verde River had been rising. Construction engineers knew that, with the steady rise of the river, trouble was just ahead unless an artificial embankment could be made with sand bags. With this in mind 75 workmen set to work filling sand bags, transporting them and placing them with as much haste as possible. But their efforts were futile against the forces of nature and at 11:30 a.m., July 8, 1937 the flood waters broke over the embankment, carrying away everything in the path of the mad onrush of water.

Lumber, forms, tools and other equipment washed away. Heavy timbers that had required the strength of many men to put in place were carried away as though they had been mere saplings. The loss caused by this flood has been

• Top: Bartlett Dam before the flood. At extreme left is cofferdam. The pipe line visible is 5 to 6 feet in diameter, carried preflood water satisfactorily. Center: After the flood rose. Pumps in foreground are 30 feet high, showing extent of water's rise. Bottom: The cofferdam as it looked when the flood waters went over. This is an extension of the top picture, but taken later.

Atlas Diesels "fill the bill" for "Uninterrupted Supply of Power"

SAXTON, LOONEY & RISLEY

334 HENRY BLDG. PORTLAND OREGON

BEACON 4787

October 12, 1937

Mr. O.B. Bjorge, Manager
Clyde Equipment Co.
Portland, Oregon

Dear Sir:

Just a note to tell you about our job at Crater Lake, Oregon just completed.

As you will recall this was a hurry-up job awarded late in the season by the Bureau of Public Roads and called for approximately 19,000 Tons of crushed rock of which 8,000 Tons was 3/4" minus requiring 40% to pass a No. 10 sieve.

To insure an uninterrupted supply of power we elected to use our two 80H.P. Atlas-Imperial Diesels and they never failed us although working at 6,200 ft. elevation.

The crushing of this rock required approximately forty days time with these same two diesels which were purchased from you in 1930.

Very truly yours,

SAXTON, LOONEY & RISLEY

by J. S. Risley

P.S. We are now moving the Atlas-Imperials over to Eagle Point where we are to run out about 11,000 cubic yards for the State of Oregon.

Two 80 H.P. Atlas Imperial Power Units used by Saxton, Looney & Risley in building highways in Crater Lake National Park in Oregon.

When road builders are constructing highways in the mountain states where contract requirements or nature puts a time limit on the job—an uninterrupted supply of power at the rock crusher is highly important.

Sometimes there is no other alternative than to use Diesel power, at other times they still prefer Diesel power even when the project is located on the highlines. With Atlas Diesels driving a crusher direct or through motor drives, there is no interruption of operations due to transmission line difficulties from forest fires, wind or electrical storms, sleet and ice.

Perched on a mountain side, this picture shows the feed end of Saxton, Looney & Risley rock crusher.

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estimated by insurance experts at $17,000.00, of which a large part was for labor required to salvage as much from the water as possible.

The rushing water was allowed to flow between the buttresses, where formerly the penstock pipe had been sufficient to carry the water. Four large pumps were set to going, and ran night and day to pump out the water that had filled the pit.

With these means employed it was only a matter of a few days until the water had receeded and been pumped out of the pit enough to allow workmen to resume work once more on the Bartlett Dam.

Highway Council Meeting

The National Highway Advisory Council of the American Road Builders' Association recently met in Washington, D. C., to discuss the federal-aid highway system, the secondary, or farm-to-market system; boulevard highways, regulations pertaining to gas-tax diversion and road-fund appropriations.

Resolutions passed by the council call for the strengthening of Section 12 of the Hayden-Cartwright Road Act of 1934 so that federal funds for which a state cannot qualify within a set period will be returned to a special fund for reapportionment to those states in which no diversion of motor-vehicle transportation revenues has been made under provisions of the act.

Other resolutions call for the indorsement of the contract system and the recommendation of its use in all highway construction work; an appropriation for the study of super-highways with limited freeways as to location, construction and finance, the increase of federal appropriations for secondary, or farm-to-market roads; the consolidating, simplifying and revision of rules and regulations as applied to the road-building industry; a continued and more forceful fight against the diversion of motor-vehicle transportation revenues to non-highway purposes and the setting up of a uniform accounting system in the several states under the supervision of the U. S. Bureau of Public Roads in dispersing these revenues; an increase of regular federal-aid appropriations for highways for each of the fiscal years of 1939-1940 and 1940-1941 in the following amounts:

$150,000,000 for regular federal-aid highway system

$75,000,000 for grade-crossing elimination and protection

$50,000,000 for secondary or farm-to-market highways.

The last resolution also carries with it a recommendation that a proportionate increase be made in the appropriations for forest highways, roads and trails; roads through public lands and national parks highways.

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Beginning Central Valley Construction

First construction of permanent works of the Central Valley Project has been started near Oakley, California, on the initial four-mile section of the Contra Costa Canal, important unit of the vast water conservation enterprise.

Official notice to proceed with the work was given to Haas, Doughty & Jones and Marshall & Stacy, San Francisco contractors, by the United States Bureau of Reclamation. The construction involves earthwork and structures for a broad tidewater section of the canal extending from the Rock Slough intake near Knightsen on the lower San Joaquin River, to the first pumping plant near Oakley.

Awarding of the contract for $102,646, the lowest bid of 25 proposals received last March 1, was approved by Secretary of the Interior Harold Ickes on March 23. The delay in starting construction has been occasioned by difficulties encountered in acquiring the necessary rights-of-way.

A Federal court order to take possession of the lands in eminent domain was given the Bureau of Reclamation this week as a result of condemnation suits filed on 33 acres of the Emerson property, involving a mile of canal right-of-way, and 18 acres of the Luiz property, involving a half-mile of right-of-way. A cash bond was deposited with

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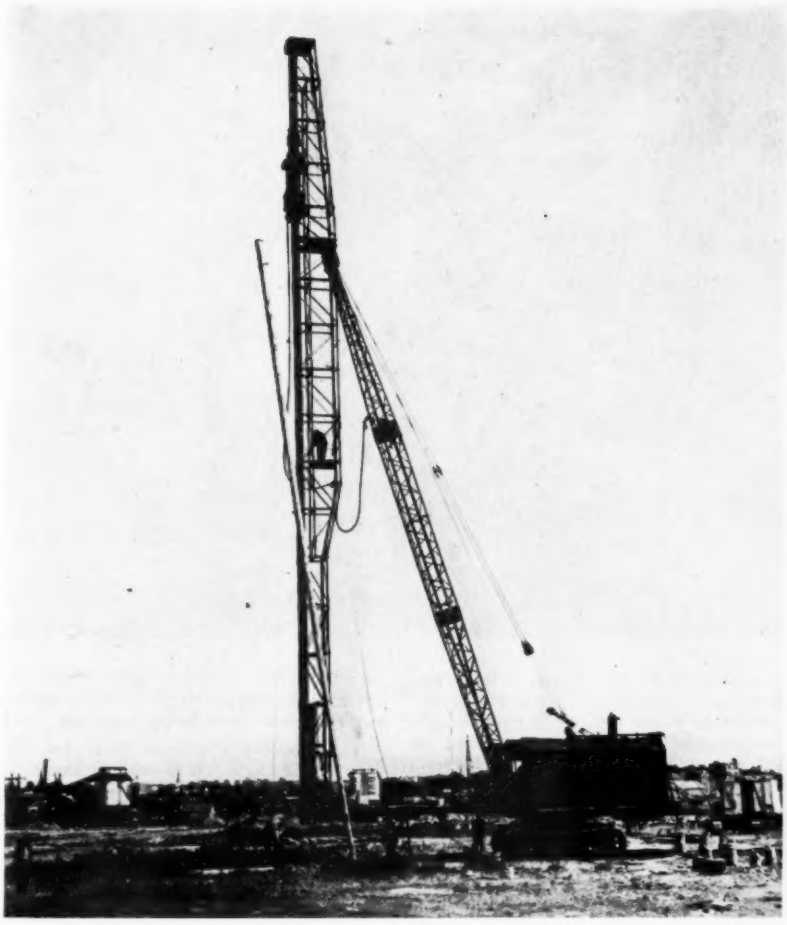


● This Faircroft Engineering Company Bucyrus-Erie steamer is one of 5 similar rigs driving piles on the New York World's Fair grounds. This machine is equipped with a 75-foot boom, 103-foot leads, and is driving piles 85 to 100 feet long. It has driven over 150,000 feet of piling to date, with a top record of fifty-two 100-foot piles in 10 hours.

the court by the Government pending future determination by a jury of the question of compensation.

Walker R. Young, the Bureau construction engineer at Sacramento, said the acute need for water in many parts of the project area makes it incumbent upon all concerned—both public and private interests—to cooperate to the fullest degree in right-of-way and water-right matters, so that large-scale construction will not be held up by involved court procedure.

Central Valley Project field work until now has been confined to extensive surveys, dam site explorations and camp building. Mr. Young said the first dirt would fly on actual construction in excavation for the Marsh Creek siphon, one of four similar structures at stream crossings in the initial section of the Contra Costa Canal. This ditch will be 24 feet wide at the bottom and approximately 100 feet wide between top of banks, involving the excavation of 640,000 cubic yards of earth. The contract also includes the erection of six farm bridges across the canal.

Meanwhile, Chief Engineer R. F. Walter of the Bureau of Reclamation announced today in Denver that advertisements soon will be issued for construction of the next eight miles of the canal, from the end of the present contract to the south boundary of the Los Medanos oil storage reservoir property.

Ultimately the Contra Costa Canal will extend from Rock Slough westerly about 40 miles to a small reservoir above Martinez. It will deliver fresh water to an important industrial district along the south shore of Suisun Bay, provide an irrigation supply for an adjacent upland area of orchards and field crops, and afford a domestic water supply for five municipalities. The canal is made necessary as a result of salt water encroachment from San Francisco Bay.

Other features of the $170,000,000 Central Valley Project, designed to protect several hundred thousand acres of California farm lands from the palsy of drought and salinity, will include the huge Shasta Dam and power plant on the upper Sacramento River, Friant Dam on the San Joaquin River, the Friant-Kern and Madera Canals in the upper San Joaquin Valley, and the San Joaquin Pumping System in the lower San Joaquin Valley.

New Canal Awards

Two contracts for canal construction were awarded recently by Secretary of the Interior Harold L. Ickes, one covering nine miles of the Yakima Ridge Canal, which will serve the new Roza Division of the Yakima Federal Reclamation Project in Washington, and the other covering about six miles of the Black Canyon Canal, which will serve the new Payette Division of the Boise Federal Reclamation project in Idaho.

The contract for construction on the Yakima Ridge Canal was awarded to the Guthrie-MacDougall Company, of Portland, Oregon, and the Mark C. Walker and Son Company, of Omaha, Nebraska, on their bid of $486,645.90. It was the lowest of eight bids received and opened September 22 by the Bureau of Reclamation at its Yakima, Washington, office.

The contract for construction on the Black Canyon Canal was awarded to Haas, Doughty & Jones and Marshall & Stacy, of San Francisco, California, on their bid of $174,333.90. This was the lower of two bids opened by the Bureau of Reclamation at its Boise, Idaho, office, September 20.

The Black Canyon Canal will serve to provide water for 47,000 acres of new land, while the Yakima Ridge Canal will serve 72,000 acres of desert land. Water supplies for both these developments were constructed a number of years ago in conjunction with the building of earlier division of the Boise and Yakima projects.

Golden Gate Bridge Picture Available

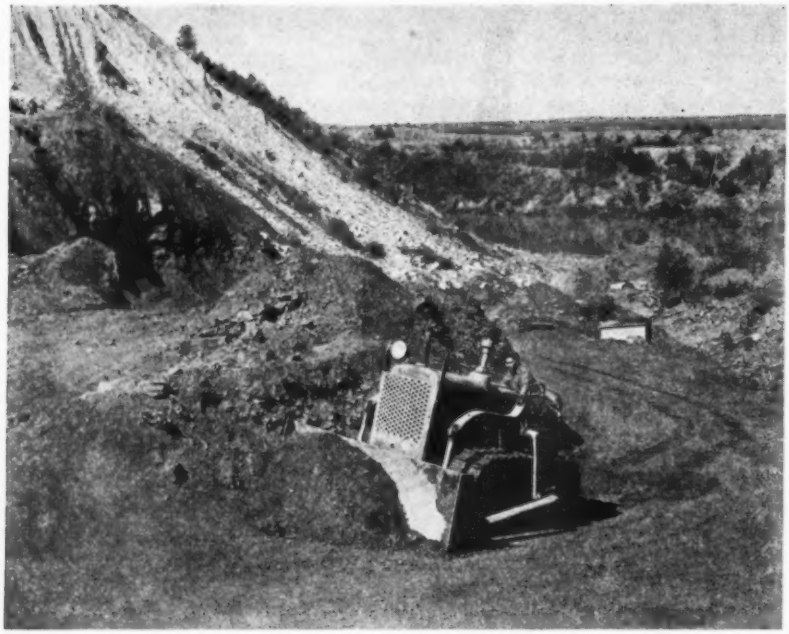
A new motion picture entitled "Building the Golden Gate Bridge" has just been completed by Bethlehem Steel Company. It is a talking picture with a descriptive lecture on the sound track.

The picture gives a complete story of the construction of the bridge across the Golden Gate at San Francisco, beginning with the arrival of the steel on the bridge site. The succeeding scenes follow the erection schedule faithfully.

The huge steel towers, 746 feet high, that support the cables are seen to rise from their foundations as the steel is assembled and placed in position. The construction of the superstructure for the roadway on the 4200 foot suspended span is depicted in detail. Of particular interest are the many special methods required in handling the steel due to the great size of the structure.

Many difficult problems in the construction of the Golden Gate Bridge had to be solved and the methods used are discussed in the descriptive lecture on the sound track of the picture.

The Bethlehem Steel Company will



• Maintaining hauling roads is an ever-present problem at most quarries and open pit mines. Here, Masaba Construction Company's TD40 TracTracTor and Bucyrus-Erie bulldozer are working at the Black Rock Mining Company iron mine 2 miles north of Virginia, Minnesota.

be glad to show the picture before representative groups of contractors, engineers or other interested groups. Arrangements are made by writing to Bethlehem Steel Company, Bethlehem, Pennsylvania.

Candid Camera Shows Highway Needs

The average motor vehicle driver wants plenty of clearance in passing other vehicles and there are few drivers that barely clear the passed vehicle. This is the conclusion of a candid cameraman of the Bureau of Public Roads who trailed motorists and made a motion picture record of their actions in passing other vehicles. The purpose was to throw more light on the width of highway necessary for the safety and convenience of modern traffic.

The camera was mounted upon a bracket just outside the driver's window; and a mechanical arrangement enabled him to operate it while driving. The pictures were later studied to determine what positions motor vehicles take on the road when passing other vehicles and when being passed.

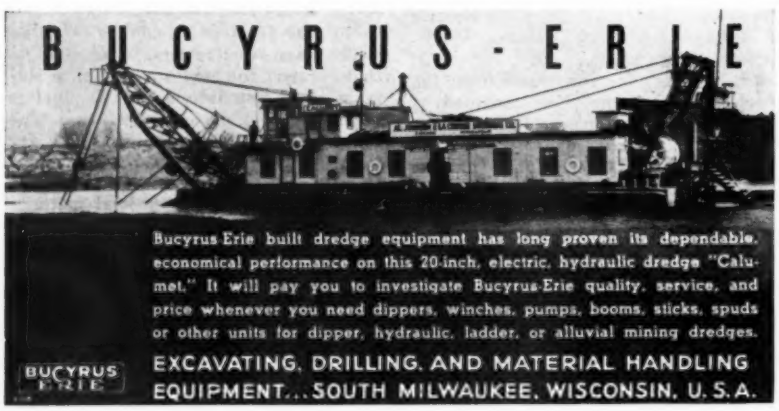
The observers placed their car in free traffic, selected a vehicle and followed 200 to 300 feet behind it, near enough to get a good picture but far enough to encourage a third vehicle to pull in between. Just as the middle vehicle pulled out to go around the leading one, the camera was started and the entire passing maneuver was photographed. The observers drove at the same speed as the vehicle being followed, and the speed was recorded. In addition, the place of passing was marked for examination and measurement of road conditions.

In this way, the observers could study the positions on the pavement of all kinds of vehicles passing in the same and opposite directions. Examples were taken on two-lane highways of 18, 20 and 22-foot widths, surfaced with portland cement concrete or bituminous concrete, and the following observations resulted.

Despite the jitters of backseat drivers, motorists usually allow ample clearance when passing other vehicles. Both cars and trucks follow the centerline of traffic lanes closely when being passed. The average clearance of passenger cars overtaking and passing other passenger cars ranges from 3.8 feet on 18-foot surfaces to 4.9 feet on 22-foot surfaces. For opposite-direction passing the range is from 4.0 feet to 5.7 feet.

Speed has an effect on the car's position on the pavement. As the speed increases, drivers tend to travel farther away from the right edge of the road. A car passing another car going in the same direction requires more road width than one passing from the opposite direction, for it must travel faster than the car in front. On pavements only 18 feet wide, the left wheels of the passing vehicle are often driven on the shoulder.

In general, it was found that roads 18 feet wide are too narrow either for passenger cars alone or for mixed traffic; that pavements 20 feet wide are inadequate for dense traffic involving trucks, but are reasonably satisfactory for the more lightly traveled roads with few trucks; and that a road width of 22 feet is entirely adequate, safe and comfortable for modern mixed traffic.



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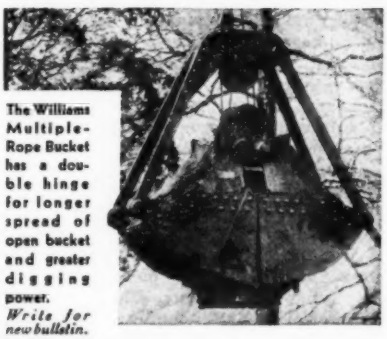

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Drag Scraper making long cut and fill at foot of hill.

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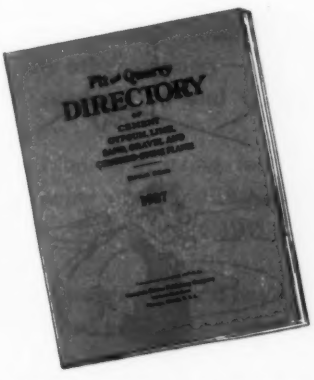

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NOT in the *Contract*

Father: "Son, now you tell me why I just punished you."

Son: "Cripes, Pa, first you wallop hell outa me and now you want to know why you did it?"

Two small boys were walking down the street when they chanced to pass a small girl.

One of the boys said: "Her neck's dirty."

The other boy said: "Her does?"

Greatly agitated, a woman carrying an infant dashed into a drug store.

"My baby has swallowed a bullet," she cried. "What shall I do?"

"Give him some castor oil," replied the druggist calmly, "but be sure you don't point him at any one."

"Sorry, madam, but licenses are issued only when your form is filled out properly."

"Why, I like your nerve, sir! I've had all kinds of compliments on my figure."

The old farmer was seeing the sights of the city when he saw a sign on a door—"Women's Exchange."

Entering he found a woman clerk glaring at him from behind a counter, and he asked:

"Is this the Women's Exchange?"

"Yes," came the curt reply.

"And are you the woman?"

"Yes."

"Then I'll stick to Martha!"

"Papa, what d'ya call the person who brings you in contact with the spirit world?"

"A bartender, my son."

"Name?" queried the immigration official.

"Sneeze," replied the Chinese proudly.

The official looked hard at him.

"Is that your Chinese name?" he asked.

"No. Melikan name," said the Oriental blandly.

"Then let's have your native name."

"A. Choo."

After a hard day's trip on a coast to coast bus, during which there were numerous stops, an old lady complained to the driver.

"Say, young man, seems like we stop at every other telegraph pole."

"Well, mam," the driver replied, "this is a Greyhound bus."

Model factories nowadays are fenced around with pickets.

"Who's boss at your house?"

"Well, my wife and I share the job. She bosses the servants, the children and me. I attend to the goldfish."

She laughed when I sat down to play. How did I know she was ticklish?

A roadster skidded around the corner, jumped into the air, knocked down a lamp post, smacked three cars, ran against a stone fence, and then stopped. A girl climbed out of the wreck. "Darling," she exclaimed, "that's what I call a real kiss!"

First Hospital Interne: "Why do you call that new nurse 'Appendix'?"

Second Ditto: "Because all the doctors want to take her out."

The poker game started early Saturday evening, and was still going when Sunday's sun rose. It was agreed to make the next hand the finish.

After the deal, the open, the draw, the bet, and several raises, everyone dropped out but a tractor skinner and a shovel runner.

They raised back and forth with the utmost confidence till the pot was a breaker. Finally the tractor skinner gave in and called.

"What 'cha got?"

"Nothin' but jacks" came the sad answer.

"How many?"

"One."

"It's good."

• "You're sure this new boss doesn't object to practical jokes?"

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National Press Building, Washington, D. C.

For your convenience in writing to American Road Builders Association you will find a card bound in this issue.

Aqueduct Safety

(Continued from page 685)

along the aqueduct. At these meetings frank discussion is encouraged, ways and means for furthering the safety work are carefully considered, and those adopted are put into operation. Safety rallies, with large groups of workmen in attendance, have done much toward maintaining enthusiasm for safety.

2. Safety literature published by the National Safety Council, U. S. Bureau of Mines, U. S. Public Health Service, U. S. Bureau of Labor, State Industrial Accident Commission, State Division of Housing and Sanitation, American Institute of Makers of Explosives, compensation insurance companies and other recognized authorities, has been procured and distributed among the construction force. These organizations have rendered many other valuable services which have materially benefited safety activities.

3. Bulletin boards are located at various camps and are serviced weekly with safety posters and safety bulletins.

4. First-aid training has been conducted annually in aqueduct camps, principally by the U. S. Bureau of Mines, by compensation insurance companies and the Safety Division of the Metropolitan Water District. Inter-camp first-aid contests are held and prizes awarded to the winning teams. The knowledge acquired through this training has served well in cases of emergency, but greater benefits lie in the understanding which the men get of the consequences of accidents. This has made them more diligent in protecting themselves and their associates from injury.

5. A mine rescue station is maintained by the District under the direct supervision of the Safety Division and includes an enclosed truck, ten sets of McCaa oxygen-breathing apparatus and appurtenant mine rescue equipment. Rescue squads are trained by the U. S. Bureau of Mines. This unit is available at any time in case of a tunnel fire or other major emergency. To date there has been no occasion for calling this unit into service.

6. Safety contests are held and monthly and annual awards are made on the basis of the lowest lost-time accident frequencies. Write-ups with photographs in the District's paper, the Aqueduct News, add not a little to the competition.

7. Copies of the District's safety rule book are distributed among supervisors and workmen. In the main these rules have been favorably received and well observed.

● **The work of Tom W. Osgood, Safety Engineer, is one reason for the steadily lowering aqueduct accident rate.**

8. Change-houses and other sanitary facilities are provided and appurtenant regulations are operative in the tunnels and on the surface.

9. Disciplinary measures have been applied for infractions of the safety and sanitary rules. It is the aim to make this discipline firm and fair.

Construction of tunnels and surface units has been carried on at top speed during 24 hours a day since February, 1933, in eight-hour shifts. The 37 tunnels have been driven from 66 headings simultaneously with the surface units. During the first four and a half years about 42 million man hours were worked and the construction carried on at a record-breaking speed by 29 contracting firms and two District force accounts.

The concerted safety work carried on by the executives, supervisors, engineers and workmen on the aqueduct during the entire period, owes its outstanding success, according to Safety Engineer Osgood, to the efficient cooperation of all concerned.

● **Supporting tunnels as fast as headings advance is an important safety precaution. At left is steel type support; at right, timber type.**

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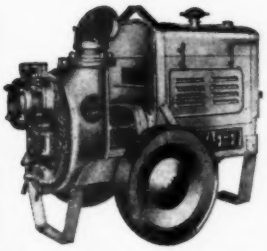

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in used excavating equipment

(taken from page 718)

BUCYRUS-ERIE 16-B gasoline shovel. Waukesha 6MS—6-cylinder 3¾"x4¾" engine. Electric starter. Good operating and mechanical condition. Located Wisconsin. Box 1198-SS.

For other bargains in shovels, draglines, cranes, locomotives, trenchers, and miscellaneous contractors' equipment turn to pages 718 to 722.

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TRY IT ON YOUR ELECTRIC SHOVELS

THIS is the story of a visit to a large West Virginia coal mine in search of information on G-E tellurium-rubber cable.

Our party, accompanied by the superintendent, rode the cars three miles to the face, where we found this loading machine going full blast.

Through the din and dust, we viewed the action. As the cars banged in and out, we tried to watch the cable. Sometimes it was buried in the ever-moving coal; once it was under the tractor tread of the loader. Then it was on top of a car; next time, under the wheels of a car. These things happened despite the helper's efforts to take care of the cable.

Cable Was In Good Shape

The photograph, unretouched, shows the cable rather clearly. Those several tapings covered bruises, the operator said, where the cable was jammed by a "motor" up against the solid block of the loader. Aside from these, however, the cable was in good shape, with few nicks and no signs of wear.

The operator swore that the cable was *great*. The superintendent concurred—said that it was giving excellent service. The same opinion was expressed by other mining men to whom we talked.

Try Out Tellurium Cable

When next you need cable for replacement on any of your cutters, loaders, reel locomotives, electric shovels, or other portable equipment, give G-E tellurium-rubber cable a trial. It is really tough stuff and will give the best of service. Your G-E jobber can supply all types and sizes promptly. For prices and specifications, see Bulletins GEA-1728 and GEA-1918. Address nearest G-E jobber, G-E sales office, or General Electric, Dept. 6B-201, Schenectady, N. Y.

This ad is one of a series written after visits to coal mines in Pennsylvania, West Virginia, and Ohio. Names of the mines and of the men interviewed will be furnished upon request.

520-98

GENERAL ELECTRIC

For your convenience in writing to the advertisers on this page, you will find a card bound in this issue.

Book reviews

The fourth edition, **Procedure Handbook of Arc Welding Design and Practice**, includes the latest weld symbols adopted by the American Welding Society in May, and a new introduction to part six, "Designing For Arc Welded Steel Construction of Machinery," according to latest announcement just received from the publishers, The Lincoln Electric Company, Cleveland, Ohio.

From the **American Petroleum Industries Committee**, 50 West 50th St., New York, N. Y., comes the 1937 edition of Automobile Facts and Figures by the Automobile Manufacturers Association, Inc. Included are figures for factory sales, foreign sales, capital invested, employment and wages, registration, number of dealers, and total taxes on motor vehicle owners.

"Caterpillar" Elevating Graders and the work that they will do are the topics of a new booklet just issued by **Caterpillar Tractor Co.**

Operating and construction features of both the No. 48 and the No. 42 power controlled graders are presented and reviewed in the booklet. Photographs with captions, charts and printed matter point out the features of the machines.

Blaw-Knox Company, Pittsburgh, Pennsylvania, has just issued its Catalog No. 1582 covering Blaw-Knox Trukmixers and Agitators and the complete service rendered by Blaw-Knox to the ready-mixed concrete industry. A copy of this catalog will be sent upon request to interested and responsible parties.

SKF Steels, Inc., has just released a new catalog on drill steels. It contains a vast amount of data, gathered from many sources. This material is presented in a non-technical style and contains many pointers for both users and buyers of rock drill steel.

A free copy may be obtained upon request, from SKF Steels, Inc., 369 Lexington Avenue, New York, New York.

The Austin Western Road Machinery Company, Aurora, Illinois, announce a new bulletin describing their No. 100 portable crushing and screening plant. The 12-page booklet contains illustrations and specifications featuring the use of the plant and its operation. Copies may be had upon request to the manufacturer.

The Proceedings of the Thirty-first Annual Meeting of the **National Paving Brick Association** held in Detroit, Michigan, January 27, 28 and 29, 1937 are presented in a 71-page illustrated booklet with the compliments of this Association which has its offices in the National Press Building, Washington, D. C.

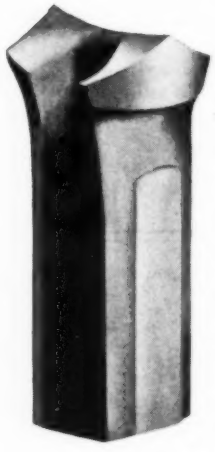
Entitled "USS COR-TEN—The Low-cost, High-strength, Corrosion-resisting Steel of Many Uses," a new booklet has just been published by the **United States Steel Corporation Subsidiaries.**

This 68-page book is printed in two colors. Many illustrations, tables and factual data on typical installations show the use to which USS COR-TEN has been placed.

A new "Pipe Repair Handbook," published by **M. B. Skinner Company**, South Bend, Indiana, discusses all the various kinds of leaks in pipe lines,—holes, splits, pitted or corroded sections; and joints of various kinds such as threaded joints, bell and spigot joints, welded joints, collars, etc.

It is sent without cost to men responsible for pipe maintenance.

The Iowa Manufacturing Company, Cedar Rapids, Iowa, have just published a bulletin containing information in detail on Cedar Rapids items such as: Cedar Rapids-Symons Horizontal Vibrating Screens, Revolving Screens; Steel Trucks; Bucket Elevators; Conveyors, Lattice and Channel



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Copies of the latest folder describing Rex pumps and mixers are now available upon request to the **Chain Belt Company**, Milwaukee, Wisconsin. Pumps handling 7,000-125,000 gallons per hour are shown as are several of the Rex concrete mixers.

A 28-page booklet covering the Cletrac "AG" streamlined tractor has just been announced by the **Cleveland Tractor Company**, Cleveland, Ohio. Each feature is explained and illustrated and large sectional diagrams show the inner workings of the tractors.

The new catalogue on Thor Mining and Contractors' Tools, contains complete information and specifications on all Thor Rock Drills, Paving Breakers, Clay Diggers, and related tools, and may be obtained upon request to the **Independent Pneumatic Tool Company**, Chicago, Illinois.

Trade notes

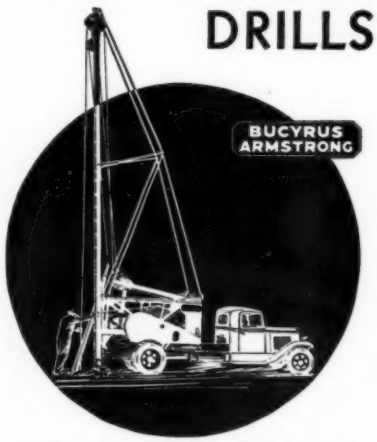
George C. McNutt has joined **Bert S. Gittins Advertising**, Milwaukee to help handle the agency's industrial accounts. For the past two and a half years he was advertising and sales promotion manager of R. G. LeTourneau, Inc., Peoria, Illinois, manufacturer of heavy construction equipment.

Road Builders Equipment Company, 635 Union Ave., Memphis, Tennessee, has just been appointed distributor for the **Bucyrus-Erie** line of smaller excavators and will deal with counties only, in the states of Tennessee and Mississippi. They already are distributors for the Bucyrus-Erie line of Tractor Equipment.

The International Harvester Company general offices have been moved from 606 South Michigan Avenue, Chicago, to a 23-story building at 180 North Michigan.

The new quarters, at the southwest corner of Michigan Avenue and Lake Street, are in what was known as the Lake-Michigan Building but has been renamed the Harvester Building.

Modern—
WATER WELL DRILLS



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Under 2 Yards

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BUCYRUS-ERIE—10-B factory rebuilt. New machine guarantee. Gasoline shovel, clamshell, dragline or drag shovel. Front-end equipment brand new. 14" Cat. treads. Electric starter. Located Western Pennsylvania. Box 1197-SS.

BUCYRUS-ERIE 10-B GAS—combination shovel, drag shovel and clamshell. 14" Cat. treads. Hercules 6-cyl. engine. Good condition. Favorable price. Located Central N. Y. State. Box 2000-SS.

INSLEY — TYPE C — GASOLINE SHOVEL. Engine recently rebored and reconditioned. Machine generally in good operating and mechanical condition. Equipped with Buda type KTU engine. Located Arkansas. Box 814-SS.

MICHIGAN—⅜-YARD truck shovel and crane. 25' crane boom. Said to be in good operating condition. Can be inspected. Located New York. Box 1184-SS

UNIT TYPE B, ⅜-yard gas shovel, just overhauled, cleaned and painted; good operating condition—$1400. FOB cars, Milwaukee. Box 1195-SS.

½-YARD

BROWNING—½-YARD GASOLINE SHOVEL and clamshell. Clamshell boom 30' plus 10' extension. Clamshell bucket included. Good condition. Located Maine. Box 1115-SS.

BUCYRUS-ERIE 16-B GAS SHOVEL. 16'6" boom—12'6" dipper handle—½ cubic yard cast front inserted tooth dipper. Waukesha 6 cylinder 3¾"x4¾" gasoline engine. Excellent condition. Will demonstrate. Located western New York State. Box 930-SS.

BUCYRUS-ERIE 1020 gas shovel and dragshovel. 18' shovel boom. 13' shovel dipper handle, ½ yard shovel dipper. Dragshovel equipment ½ yard front opening type of dipper. Electric starter. Waukesha DR 4 cylinder gas engine. Reported in good operating condition. Located Rhode Island. Box 956-SS.

BUCYRUS-ERIE 16-B gasoline shovel. Waukesha 6MS—6-cylinder 3¾"x4¾" engine. Electric starter. Good operating and mechanical condition. Located Wisconsin. Box 1198-SS.

BYERS — BEARCAT — ½-YARD SKIMMER scoop and trenching machine. Located near Boston. Box 980-SS.

GENERAL—GASOLINE ½-yard shovel and 35' boom clamshell. Located Central Illinois. Box 1187-SS.

P & H—MODEL 300—½-yard gasoline shovel. Located Kentucky. Box 1107-SS.

P & H MODEL 204 GAS combination ½-yard shovel and 42' boom crane. Waukesha 4-cylinder 5"x6¼" engine. Good condition considering age. Located San Francisco. Box 1005-SS.

⅝-YARD

BUCYRUS-ERIE Type A steam shovel. 16' boom. 12'-6" dipper handle. ⅝ yard shallow cut dipper. Two speed propelling mechanism. Hand operated boom hoist. Located vicinity New York. Box 958-SS.

BUCYRUS-ERIE TRAILER, suitable for 17-B or 19-B machine. Practically new. Located Boston. Box 1116-SS

¾-YARD

AMERICAN STEAM SHOVEL. Oil burning. Caterpillar mounted. Main machinery and boiler very good. Balance of machinery needs some repairs. Located Arkansas. Box 965-SS.

BUCYRUS-ERIE TYPE B high lift steam shovel. 19'6" shovel boom. 16' dipper handle. ¾ yard dipper. Also 42' boom clamshell equipment. Located Virginia. Box 961-SS

BUCYRUS-ERIE TYPE B steam shovel. High lift. Boiler reported good condition and machinery generally in fair condition. Located Rockford, Illinois. Box 963-SS.

For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.

FOR SALE

Address all box numbers c/o EXCAVATING engineer . . . . . at South Milwaukee, Wisconsin

BUCYRUS-ERIE TYPE B STEAM combination Shovel-clamshell and steam hoe. Machine completely rebuilt 1929. Good operating condition. Located near Boston. Box 517-SS.

BUCYRUS-ERIE (2) TYPE "B" HIGH LIFT Caterpillar mounted Steam Shovels. Good operating condition. Located Eastern Pennsylvania. Box 1014-SS.

BUCYRUS-ERIE TYPE B Steam shovel, caterpillar mounted. Located Indiana. Box 983-SS.

BUCYRUS-ERIE TYPE B STANDARD ¾ YARD STEAM SHOVEL—Quarry type Dipper — Caterpillar mounted. Good operating condition. Located Georgia. Box 752-SS.

BUCYRUS-ERIE 1030 gasoline shovel and clamshell. 23' shovel boom. 15' dipper handle ¾ yard dipper. 35' clamshell boom and Owen "M" Model 230 clamshell bucket. Wisconsin B-3 gasoline engine. Cylinder blocks recently rebored. Machine in fair condition. Located Massachusetts. Box 982-SS.

BUCYRUS-ERIE—Type B Steam Shovel and Clamshell. 19'9" Shovel Boom—16' Dipper Handle—¾-yard Dipper. 40' Clamshell Boom. Also Ford Truck with 500-gallon steel water tank and pump. Reported to be in good operating condition. Located New Hampshire. Box 1164-SS

If You Do Not Find What You Want Listed—Write Us

EXCAVATING engineer

South Milwaukee, Wis.

BUCYRUS-ERIE TYPE B high lift steam shovel. Excellent operating condition. Located Seattle, Washington. Box 943-SS.

BUCYRUS-ERIE—TYPE B ¾ YD. Caterpillar mounted Extra high-lift steam shovel. Located Chicago. Good working order. Will rent or sell. Box 1100-SS.

3—BUCYRUS-ERIE—TYPE B ¾-YD. STEAM SHOVELS. Have been well maintained and now in good operating condition. Located Detroit. Box 1117-SS

BUCYRUS-ERIE TYPE B steam ¾-yard shovel and 36' boom clamshell including ¾-yard Williams clamshell bucket. Located Central New York. Box 1188-SS.

NORTHWEST—MODEL 105, ¾ yard gasoline shovel. Climax 4 cylinder 5½"x7" gasoline engine. Good operating condition. Located Eastern Pa. Box 1015-SS.

OSGOOD MODEL 18 STEAM—¾ yard shovel—Cat mounted. Just completely overhauled. Excellent condition. Located near Indianapolis, Ind. Box 522-SS.

OSGOOD — GASOLINE — COMBINATION shovel, clamshell, and dragline equipped with electric starter. Shovel Boom 9'6"—Dipper Handle 14'—Dipper 1 yard standard and 1½ Beet Loading Type. 40' Clamshell and Dragline Boom. Hercules 6 cylinder 85 H.P. engine. Fair condition — good appearance. Located Colorado. Box 1018-SS.

⅞-YARD

BUCYRUS-ERIE—1035 GASOLINE SHOVEL. Chain Crowd. ⅞-yard Dipper. 26-in. caterpillar treads. Electric starter. Needs some repairs. Located vicinity Boston. Box 1065-SS.

BUCYRUS-ERIE—B-2—HIGH LIFT Caterpillar Mounted Steam Shovel. Good Operating condition. Located Eastern Pennsylvania. Box 1019-SS.

BUCYRUS-ERIE TYPE B-2, ⅞-YARD high lift steam shovel. Located Boston. Box 1089-SS.

BUCYRUS-ERIE TYPE B-2, ⅞-YARD high lift steam shovel. Located Lawrence, Mass. Box 1090-SS.

2—BUCYRUS-ERIE—B-2—HIGH LIFT STEAM shovels. 21'3" booms, 16' dipper handles, ⅞-yard dippers. Power boom hoists. Single shaft caterpillars. Located Massachusetts. Box 1119-SS.

BUCYRUS-ERIE—B-2—HIGH LIFT STEAM shovel. 21'3" boom, 16' dipper handle, ⅞-yard dipper. Single shaft caterpillar. Located Vermont. Box 1135-SS.

BUCYRUS-ERIE—Type B-2 Steam Shovel. Reported fair operating condition. Located near Boston. Box 1157-SS

BUCYRUS-ERIE—TYPE B-2 high lift steam shovel. 19'9" boom—16' dipper handle—⅞-yd. dipper. Cat. mounted. Reasonably good condition. Box 1175-SS

MARION MODEL 21 — ¾ CUBIC YARD steam shovel. Caterpillar mounted. Good working condition. Located Georgia. Box 758-SS.

1-YARD

BUCYRUS-ERIE GA-2 GAS-AIR SHOVEL 22'6" boom—16' dipper handle—one yard dipper. Waukesha four cylinder 5¾"x8" engine. Overhauled approximately one year ago. Fair condition. Located Knoxville, Tennessee. Box 870-SS.

BUCYRUS-ERIE—GA-2 Gas-Air High Lift 1 yard shovel. Air starter. Single Shaft Cat. Fair condition. Located Western New York. Box 996-SS.

BUCYRUS-ERIE GA-2 COMBINATION shovel and clamshell. 24' boom. 18'4" dipper handle—1 cu. yd. cast front inserted tooth dipper. 45' boom. Complete clamshell equipment including 1 yard Williams Fav. Clamshell bucket. Air starter. Single shaft cat. Waukesha 4 cylinder 5¾"x8" gas engine. Fair operating condition. Located Eastern Pennsylvania. Box 932-SS.

BUCYRUS-ERIE GA-2 — Gas-air — high lift shovel. Good operating condition. Located Eastern Pennsylvania. Box 945-SS.

BUCYRUS-ERIE 1030 — ELECTRIC TUNNEL shovel. Boom 10 ft. 7 in. Dipper handle 10 ft. 5 in. 1-yd. dipper. Boom hoist 5 ft. 6 in. rear end clearance. 2 motor—power supply 3 phase, 60 cycle, 440 volt. Located Virginia. Box 1068-SS

BUCYRUS-ERIE—D-2 1 yard Diesel Shovel. Atlas engine. Said to be in very good condition. Located South Carolina. Box 1079-SS

BUCYRUS-ERIE GA-2 SHOVEL AND CRANE. 22 ft. 6 in. shovel boom, 16-ft. dipper handle, 1 cu. yd. cast front inserted tooth dipper, 50-ft. box type crane boom. Air starter. Good condition. Located Newark. Box 718-SS.

BUCYRUS-ERIE 31-B — 1 YARD STEAM shovel. Located Lawrence, Mass. Make an offer. Box 1092-SS.

BUCYRUS-ERIE—B-2 AIR, tunnel shovel. Boom 14'6". Dipper handle 10'9". Dipper ⅞-yard capacity. Located Ohio. Box 869-SS.

BUCYRUS-ERIE—GA-2 GAS AIR. Extra high-lift shovel. 24' boom, 18'4" dipper handle—1 yd. dipper. Single Shaft Caterpillar. Waukesha 4 cylinder 6¼" by 8" engine. Good working order. Will rent or sell. Located Central Illinois. Box 1103-SS.

BUCYRUS-ERIE 31-B — 1 YARD STEAM SHOVEL. Located Tennessee. Box 1093-SS.

BUCYRUS-ERIE — GA-2 — GAS-AIR — extra high lift shovel. 24' boom, 16' dipper handle, 1-yard dipper. Air starter. Mass. air tanks. Single shaft caterpillar. Located Massachusetts. Box 1121-SS.

BUCYRUS-ERIE—31-B STEAM SHOVEL. 22' boom, 15' dipper handle, 1-yard dipper. Now operating, can be demonstrated. Located Alabama. Box 1130-SS.

BUCYRUS-ERIE—Type B-2 Steam Shovel. Reasonably good condition. Located near Boston. Box 1156-SS

BUCYRUS-ERIE—30-B Electric Shovel. Suitable for power supply. 3 Phase, 60 Cycle, 440 Volt. Machine equipped with 3 motors. Said to be in first class operating condition. Located New Jersey. Box 1162-SS

BUCYRUS-ERIE—30-B STEAM SHOVEL. 26' boom—17' dipper handle—1¼ cu. yd. dipper. Complete machine recently overhauled and painted. Boiler about 1 year old. Located Central Illinois. Box 1176-SS

BUCYRUS-ERIE GA-2 Gas-Air 1-yard shovel. Good working condition. Will rent. Located Wisconsin. Box 1199-SS.

LORAIN—MODEL 60—1-YARD shovel. Located Southern Virginia. Box 1182-SS

NORTHWEST—MODEL 105—GASOLINE shovel—1-yard. Located Massachusetts. Box 1123-SS.

NORTHWEST MODEL 105, 1-yard gas shovel, excellent condition, brand new main ring gear; also 45' crane boom—$4500. As crane only—$3800. FOB cars, Milwaukee. Box 1196-SS.

OSGOOD—1-YARD COMBINATION shovel—Trench hoe and 45' boom dragline. Le Roi 6-cyl. engine. Fair condition. Located Central Illinois. Box 1173-SS

P. & H. MODEL 600—1-YARD GAS SHOVEL and 40' boom clamshell. Waukesha JL-6"x7" Engine. Located North Carolina. Box 1095-SS.

P & H—MODEL 600, 1 YD. SHOVEL and dragline. Shovel boom 19'6". Dragline boom 40'. Drag bucket included. Waukesha engine. Good condition. Located Central Illinois. Box 1102-SS.

1¼-YARD

BUCYRUS-ERIE—GA-2 Gas-Air High Lift Shovel. 24-ft. boom, 16-ft. dipper handle, 1¼-yard dipper. Located Virginia. Box 1063-SS.

BUCYRUS-ERIE—GA-2 Gas-Air 1¼ yd. shovel. 45' boom clamshell machine. Single Shaft Cat. Recently overhauled by owner. Located New York. Box 997-SS.

BUCYRUS-ERIE—GA-2 Gas-Air—1¼ high lift shovel. Single Shaft Cat. Electric Starter. Reported good operating condition. Located Eastern Pennsylvania. Box 998-SS.

FOR SALE

Address all box numbers c/o EXCAVATING engineer . . . . . at South Milwaukee, Wisconsin

SMALL SHOVELS
Under 2 Yards continued

TWO—BUCYRUS-ERIE—GA-3, GAS-AIR 1¼-yard shovels, Wisconsin D-2—6 cyl. 5¾"x6½" Engines. Good condition. St. Paul, Minnesota. Box 1097-SS.

BUCYRUS-ERIE 41-B — 1¼-YARD STEAM SHOVEL. Located near Boston. Very good price. Box 1096-SS.

BUCYRUS-ERIE—41-B Steam shovel. 1¼ yd. Vanderhoef dipper. Good operating condition. Located near Boston. Box 999-SS.

BUCYRUS-ERIE—41-B—STEAM SHOVEL. 21' boom, 15' dipper handle, 1¼-cubic yard dipper. Now operating. Will demonstrate. Located Alabama. Box 1131-SS

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BUCYRUS-ERIE GA-3 Gas-Air 1¼-yard shovel. Electric starter. Steel cab. Single shaft Cat. Said to be in very good mechanical and operating condition. Located San Francisco. Box 1191-SS.

KOEHRING MODEL 501 1¼ yard gas shovel. Available about August 15. Located New Mexico. Box 879-SS.

LIMA—MODEL 101—GASOLINE SHOVEL. Located Maine. Box 1132-SS

SHOVEL AND DRAGLINE
MARION 450, 1¼ yard electric shovel, 23 ft. boom, 16½ ft. handle. Also 45 ft. dragline boom and ¾-yd. dragline bucket. Suitable for 3 phase 60 cycle 2300 volts. Excellent condition. Just the machine for small clay or gravel pit. Located near Chicago. Box 978-SS.

MARION TYPE 32 STEAMER. Shop No. 5676, 18-ft. boom, 15-ft. dipper handle, 1¼-cu. yd. Recently overhauled. Box 451-SS.

2 MARION Model 450—Steam Shovels. Good condition. Located Connecticut. Box 1154-SS

OSGOOD — HEAVY DUTY — 1¼-yard Steam Shovel. Said to be in good working condition. Will sell on terms. Located Virginia. Box 1061-SS

1½-YARD

BUCYRUS-ERIE—42-B STEAM shovel. 1½-yard Vanderhoef quarry dipper. Very good mechanical condition. Can be demonstrated. Located Georgia. Box 1149-SS.

OSGOOD—VICTOR—GAS 1½ YD. SHOVEL & Clamshell. Shovel boom 23'. Clamshell boom 50'. Wisconsin D-4—6 cylinder 5¾"x6½" engine. Reported excellent condition. Located Minneapolis. Box 1111-SS.

1¾-YARD

5—MARION MODEL 37, 1¾ yard steam shovels, steel cab. Good working condition. Located Minnesota. Box 825-SS.

SMALL DRAGLINES
Under 2 Yards

⅜-YARD

BUCYRUS-ERIE—10-B factory rebuilt. New machine guarantee. Gasoline dragline, clamshell, shovel or drag shovel. Front-end equipment brand new. 14" Cat. treads. Electric starter. Located Western Pennsylvania. Box 1197-SD.

BUCYRUS-ERIE 10-B GAS—combination clamshell, shovel and drag shovel. 14" Cat. treads. Hercules 6-cyl. engine. Good condition. Favorable price. Located Central N. Y. State. Box 2000-SCC.

¾-YARD

NORTHWEST MODEL 105 GAS—40' boom dragline and clamshell, including Page "C" drag bucket. Climax engine. Reasonably good operating condition. Located Atlanta, Ga. Box 995-SD.

OSGOOD — GASOLINE — COMBINATION dragline, clamshell and shovel equipped with electric starter. 40' dragline and clamshell boom. Shovel boom 19'6" dipper handle 14'; dipper 1 yard standard and 1½ beet loading type. Fair condition, good appearance. Located Colorado. Box 1018-SD.

⅞-YARD

BUCYRUS-ERIE—1035—40' BOOM GASOLINE dragline and clamshell, including 1-yard dragline and clamshell buckets. 26" caterpillar treads. Recently overhauled. Located Colorado. Box 1118-SD.

1-YARD

BUCYRUS-ERIE DA-2 DIESEL-AIR 40' BOOM dragline. No bucket. Atlas Diesel engine. Located Eastern Pennsylvania. Box 872-SD.

BUCYRUS-ERIE—30-B DIESEL DRAGLINE. 40' boom. 1 yd. Page "S" Drag Bucket. Atlas Diesel engine. Located Central Indiana. Box 1108-SD.

BUCYRUS-ERIE — D-2 — DIESEL DRAGLINE. Atlas engine. Located Texas. 40' Boom, 1¼ yd. Page Bucket. Field reconditioned. Available about September 15. Excellent mechanical and operating condition. Box 1020-SD.

OSGOOD—1-YARD COMBINATION shovel—45' boom dragline and trench hoe. Le Roi 6-cyl. engine. Fair condition. Located Central Illinois. Box 1173-SD

P & H MODEL 600, 1 YD. DRAGLINE and shovel. Dragline boom 40'. Shovel boom 19'6". Drag bucket included. Waukesha engine. Good condition. Located Central Illinois. Box 1102-SD.

1¼-YARD

SHOVEL AND DRAGLINE
MARION 450, 45 ft. dragline boom and ¾-yd. dragline bucket. Also 1¼ yard electric shovel, 23 ft. boom, 16½ ft. handle. Suitable for 3 phase 60 cycle 2300 volts. Excellent condition. Just the machine for small clay or gravel pit. Located near Chicago. Box 978-SD.

P & H—MODEL 210—55' boom dragline including 1¼-yard Page bucket. Gas powered. Located South Dakota. Box 1172-SD

1¾-YARD

NORTHWEST. Type M—Gas Dragline. 40' plus 10' Extension Boom. 1¾-yard Omaha Bucket—nearly new. Recently put in good repair. Located Missouri. Box 1161-SD

SMALL CLAMSHELLS AND CRANES
Under 2 Yards

⅜-YARD

BUCYRUS-ERIE—10-B factory rebuilt. New machine guarantee. Gasoline clamshell, shovel, dragline or drag shovel. Front-end equipment brand new. 14" Cat. treads. Electric starter. Located Western Pennsylvania. Box 1197-SCC.

BAY CITY—⅜-YARD GAS CLAMSHELL. Located near Boston. Box 1084-SCC.

MICHIGAN—⅜-YARD truck crane and shovel. 25' crane boom. Said to be in good operating condition. Can be inspected. Located in New York. Box 1184-SCC

½-YARD

BROWNING—½-YARD GASOLINE clamshell and shovel. Clamshell boom 30' plus 10' extension. Clamshell bucket included. Good condition. Located Maine. Box 1115-SCC.

BYERS-BEARCAT gasoline combination crane, skimmer scoop and back hoe. Williams Clamshell bucket included. Located Eastern Pennsylvania. Box 957-SCC.

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South Milwaukee, Wis.

GENERAL—GASOLINE ½-yard 35' boom clamshell and shovel. Located Central Illinois. Box 1187-SCC.

P & H MODEL 204 GAS combination 42' boom crane and ½ yd. shovel. Waukesha 4 cylinder 5" x 6¼" engine. Good condition considering age. Located San Francisco. Box 1005-SCC.

UNIVERSAL—THEW Model AC-35, ½-yard gasoline truck crane. 28' boom. Mack truck equipped with dual hard tires rear and pneumatic tires front. Condition good. Located Central New York State. Box 1193-SCC.

UNIVERSAL—24' BOOM TRUCK CRANE. Sterling truck. Located Central Illinois. Box 1183-SCC

¾-YARD

BUCYRUS-ERIE 1030 gasoline clamshell and shovel 35' clamshell boom and Owen "M" Model 230 clamshell bucket. 23' shovel boom. 15' dipper handle. ¾ yard dipper. Wisconsin B-3 gasoline engine. Cylinder blocks recently rebored. Machine in fair condition. Located Massachusetts. Box 982-SCC.

BUCYRUS-ERIE TYPE B STEAM combination clamshell, shovel and steam hoe. Machine completely rebuilt 1929. Good operating condition. Located near Boston. Box 517-SCC.

BUCYRUS-ERIE—TYPE B Steam clamshell and shovel. 40' clamshell boom. 19'9" shovel boom —16' dipper handle—¾-yard dipper. Also Ford truck with 500-gallon steel water tank and pump. Reported to be in good operating condition. Located New Hampshire. Box 1164-SCC

BUCYRUS-ERIE TYPE B, steam, ¾-yard 36' boom clamshell and shovel, including ¾-yard Williams clamshell bucket. Located Central New York. Box 1188-SCC.

FOR SALE

Address all box numbers c/o EXCAVATING engineer . . . . . at South Milwaukee, Wisconsin

BUCYRUS-ERIE TYPE B CLAMSHELL and high lift steam shovel. 42' boom clamshell equipment, 19' boom, 16' dipper handle and ¾-yard dipper. Located Virginia. Box 961-SCC

NORTHWEST MODEL 105 GAS—40' boom clamshell and dragline, including Page "C" drag bucket. Climax engine. Reasonably good operating condition. Located Atlanta, Ga. Box 995-SCC

O & S MODEL "T" ⅜ yard clamshell machine. 40' boom. Good working condition. Powered with Climax 5½"x7" gasoline engine. Located near St. Louis. Good working condition. Box 651-SCC.

OSGOOD — GASOLINE — COMBINATION clamshell, dragline and shovel equipped with electric starter. 40' clamshell and dragline boom. Shovel boom 19'6"; dipper handle 14'; dipper 1 yard standard and 1½ beet loading type. Fair condition, good appearance. Located Colorado. Box 1018-SCC.

⅞-YARD

BUCYRUS-ERIE — 1035 ELECTRIC clamshell. 35' boom. ⅞ yd. Haiss Coal loading bucket. General Electric motor, 40 H.P. 3 phase, 60 cyc'e, 220 volt induction motor. Machine in excellent condition. Located New York. Box 1101-SCC.

BUCYRUS-ERIE—1035—40' BOOM GASOLINE clamshell and dragline, including 1-yard clamshell and dragline buckets. 26" caterpillar treads. Recently overhauled. Located Colorado. Box 1118-SCC.

1-YARD

BUCYRUS-ERIE GA-2 COMBINATION shovel and clamshell. 24' boom, 18'4" dipper handle —1 cu. yd. cast front inserted tooth dipper. 45' boom. Complete clamshell equipment including 1 yard Williams Fav. Clamshell bucket. Air starter. Single shaft cat. Waukesha 4 cylinder 5¾"x8" gas engine. Fair operating condition. Located Eastern Pennsylvania. Box 932-SCC.

BUCYRUS-ERIE — GA-2 — GAS-AIR 45' Boom Clamshell Machine. Good Operating Condition. Located St. Paul, Minn. Box 1024-SCC.

BUCYRUS-ERIE GA-2 CRANE AND SHOVEL. 50-ft. box type crane boom. 22 ft. 6 in. shovel boom, 16-ft. dipper handle, 1 yard cast front inserted tooth dipper. Air starter. Good condition. Located Newark, N. J. Box 718-SCC.

BUCYRUS-ERIE — GA-2 GAS AIR Clamshell. 45' boom. Single Shaft Caterpillar. Waukesha 4 cylinder 6¼"x8" engine. Rebuilt since original manufacture. Good operating condition. Located New Jersey. Box 1104-SCC.

BUCYRUS-ERIE—1035—GASOLINE 40' BOOM clamshell. Machine including 1-yard Owen clamshell bucket. Single shaft caterpillar. 24" treads. Located Massachusetts. Box 1120-SCC.

P. & H. MODEL 600—40' BOOM GAS clamshell and 1-yard shovel. Waukesha JL-6"x7" Engine. Located North Carolina. Box 1095-SCC.

1¼-YARD

BUCYRUS-ERIE GA-2 Gas-Air clamshell and shovel. 45-ft. clamshell boom. 1¼-yd. shovel. Single shaft cat. Recently overhauled by owner. Located New York. Box 997-SCC

1½-YARD

OSGOOD—VICTOR—GAS 1½ YD. clamshell & shovel. Clamshell boom 50'. Shovel boom 23'. Wisconsin D-4—6 cylinder 5¾"x6½" engine. Reported excellent condition. Located Minneapolis. Box 1111-SCC.

LARGE SHOVELS AND DRAGLINES
2 Yards and Over

1½-T MONIGHAN WALKER. Diesel power. 2 yard bucket, 60-foot boom. Good condition. Reasonably priced. Located Kansas. Box 742-LSD.

CLASS 320 STEAM DRAGLINE, 144-foot boom. 8-yard bucket. Located on Illinois river. A good buy. Box 750-LSD.

CLASS 230 STEAM DRAGLINE. 175-foot steel and aluminum boom. 6-yard RED ARCH bucket. Ready to work. Located near New Roads, Louisiana. Box 751-LSD.

FOR SALE OR RENT

320-B BUCYRUS STEAM DRAGLINE, truck mounted, 165' boom, 6 and 8 cu. yd. Bucyrus-Erie dragline buckets. Also shovel attachment consisting of 100' boom, 52' dipper handles, two 8 cu. yd. dippers (one new). Machine located on Canadian side Detroit River near Detroit; shovel attachment located in Vermont. Both duty paid into Canada. Can work or be shipped anywhere in U. S. or Canada. $10,000 worth spare parts available. Priced right. Box 926-LSD.

PRICE VERY ATTRACTIVE

BUCYRUS-ERIE 50-B STEAM combination shovel and dragline, shop number 10577. 26' boom, 17' dipper handle, 2 yd. dipper. 50' boom dragline equipment, 1¾ yd. Page bucket. 1 KW 32 volt Moon electric light plant. 54"x9'7" standard coal burning locomotive-type boiler. Also 2 steel underframe flat cars on which machine is now loaded. New 1929. Moved only 250,000 yards of material. Excellent condition. Price very attractive. Located Kansas City, Mo. Deal direct with owner. Box 900-LSD.

2-T MONIGHAN WALKER, 3½-yard bucket. 70 foot boom. Good condition. Reasonably priced. Located Kansas. Box 743-LSD.

70-C BUCYRUS STEAM SHOVEL on Cats. Complete. In operating condition. Shop number 1712. Also one extra three-yard Manganese dipper and sticks. Chicago territory. Box 347-LSD.

CLASS 14 STEAM DRAGLINE, 60' boom. 2 cubic yard Page bucket. Locomotive-type boiler. Thoroughly overhauled and ready for service. Located, Iowa. Box 771-LSD.

2—BUCYRUS-ERIE 100-B steam shovels, worked only 15 months. Also, 2 Ingersoll-Rand Diesel compressors. Very low prices for immediate sale. H. W. Nelson, 1 Wall St., New York.

TWO 3-W MONIGHAN WALKERS, 3½ yards. 70- and 77-foot booms. Good condition. Reasonably priced. Located Louisiana. Box 745-LSD.

BUCYRUS 320-B STEAM STRIPPING shovel, shop number 4205, new in 1925, used less than four years. Located at Toronto, Ohio. Box 74-LSD.

2-W MONIGHAN WALKER, 2½ yard capacity 70-foot boom. Good condition. Priced reasonably. Located Louisiana. Box 744-LSD.

BUCYRUS-ERIE 50-B Steam shovel and 45-ft. boom dragline, located Montana. Attractive price. Box 845-LSD.

P&H MODEL 900, 3½ yard Diesel Shovel, 33-foot boom, 200 h.p. Fairbanks-Morse engine. Mounted on caterpillars. Box 828-LSD.

BUCYRUS-MONIGHAN 4-W Walking dragline. 80' boom 5½ yard Page bucket, 30' boom insert and 4-yard bucket. Located Tennessee. Box 844-LSD.

FOR SALE OR RENT

CLASS 24 BUCYRUS STEAM DRAGLINE. 125' boom. Skid and roller mounted. Spare parts. Located on Detroit River near Detroit. On Canadian side, duty paid into Canada, but can work or be shipped anywhere in U. S. or Canada. Priced to sell. Box 927-LSD.

ANY FAIR OFFER ACCEPTED

Class 24 steam dragline. 100 foot boom, 5 cubic yard buckets. Skid and roller mounted. Rebuilt 1927 at a cost of $15,000. New locomotive boiler installed 1928. Will accept any fair offer. Located near Fort Worth, Texas. Box 823-LSD.

BUCYRUS-ERIE — 55-B — DIESEL SHOVEL. 27'6" Boom, 18' Dipper Handle, 2½ yard Dipper. Atlas Diesel Engine. New 1935. Excellent mechanical and operating condition. Located Oregon. Box 1036-LSD.

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BUCYRUS-ERIE — 52-B — DIESEL 2¼ yard Shovel and Dragline. Atlas engine. Good condition. Located Eastern Pa. Box 1039-LSD.

BUCYRUS-ERIE — 100-B — STEAM SHOVEL. 3 yard Dipper. Revolving machinery, very good condition. Located Montreal, Canada. Box 1041-LSD.

BUCYRUS-MONIGHAN—MODEL 4-T — 4-yard Diesel Dragline. 110' Boom. Good Condition. Located Nebraska. Box 1047-LSD.

MARION—MODEL 350—8 yard Electric Shovel. Power equipment, 3 Phase, 60 cycle, 2300 volt—Ward-Leonard Control. Mounted on railway trucks. Good condition. Located Minnesota. Box 1049-LSD.

MARION—MODEL 70—3½ yard Electric Shovel. Railway truck mounted. Power Equipment, 3 Phase, 60 cycle, 2300 volt. Good condition. Located Ohio. Box 1050-LSD.

PAGE—MODEL 220—2½ yard Diesel Dragline. 85' Boom. Good operating condition. Located Iowa. Box 1052-LSD

BUCYRUS-MONIGHAN 3-T DIESEL dragline. 80-ft. steel boom, 3 cu. yd. drag bucket. 120 h.p. Fairbanks-Morse type "YVA" engine. 1500 watt Kohler light plant. Just completing job on Illinois River. Can be seen operating. Box 1056-LSD

BUCYRUS-ERIE — 75-B Electric Combination Shovel and Dragline. 29-ft. shovel boom, 20-ft. dipper handle, 2½-yard dipper, 85-ft. dragline boom with mast suspension. Suitable for power supply, 3 phase, 60 cycle, 2300 volt. Induction motors. Said to be in excellent working condition. Located Eastern Pennsylvania. Box 1058-LSD.

BUCYRUS-ERIE 50-B — 2-yard Steam Shovel. Located Texas. Low Price. Box 1059-LSD

BUCYRUS-ERIE 55-B—Extra High Lift Diesel Shovel. 35-ft. boom. 22-ft. dipper handle, 2 cu. yd. Bowl Door dipper. Caterpillar mounted. Kohler light plant. Atlas Diesel engine. Used about three months. Just like new. Located Eastern Pennsylvania. Box 1069-LSD

FOR SALE

Address all box numbers c/o EXCAVATING engineer . . . . . at South Milwaukee, Wisconsin

LARGE SHOVELS AND DRAGLINES
2 Yards and Over continued

BUCYRUS-ERIE—CLASS 24 DIESEL dragline. 130-ft. boom, 4 cu. yd. bucket. Truck mounted. 165 h.p. Anderson Diesel engine. Friction drive. Said to be in good operating condition. Located on Mississippi River near New Orleans convenient for loading on barge.
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BUCYRUS-ERIE—175-B TRACK MOUNTED steam shovel. 85' boom, 58' dipper handle, 3½-yard dipper. Good condition except dipper handle and boiler. Bargain. Located near Pittsburg, Kansas. Box 1134-LSD.

BUCYRUS-ERIE—175-B TRACK MOUNTED steam shovel. 75' boom, 48' dipper handle, 3½-yard dipper. Located North Dakota.
Box 1137-LSD

PAGE—MODEL 220 — Electric dragline. 90' boom, 3½-yard Page R.C. drag bucket.
Box 1124-LSD

BUCYRUS-ERIE 50-B Ward-Leonard Electric Shovel. 30' Boom, 17' Dipper Handle, 2-yard Dipper. Equipped for power supply of 3 Phase 25 Cycle 440 Volt. Can be converted to 60 Cycle at approximate cost of $500.00. Located Southern Illinois. Fair operating condition. Can demonstrate. Box 1158-LSD

LOCOMOTIVES

LOCOMOTIVES

1 Baldwin Locomotive, 17x24, standard gauge, 45-ton, shop No. 33202.
2 Baldwin Locomotives, 19x26, standard gauge, 6-wheel, shop Nos. 39534 and 39536.
4 American Locomotives, 20x26, 60-ton, shop Nos. 5945, 5949, 42354 and 45323.
All of the above have passed State Boiler Inspection yearly; will stand 240 lb. cold water tests. At present are in actual service in Minnesota Mines. Box 1194-ME.

MISCELLANEOUS EQUIPMENT

TRACTOR DUMP WAGONS, Automatic, McCormick-Deering powered. 5-yard capacity. Either track mounted, pneumatics or steel wheels. Several new and used available at bargain prices.
Box 1174-ME

DIESEL POWER UNIT

NEW LATEST DESIGN International McCormick-Deering PD-40 Diesel Power Unit directly connected to new Palmer 30 KW 110-220 Volt Electric Generator. Priced complete to move quickly. Located Los Angeles. Box 1165-ME

FRUEHOFF SEMI-TRAILER with 8' by 26' Deck. (Can be shortened). Excellent solid rubber tires. Air Brakes. 20 ton capacity. Located New York. Box 1160-ME

DRAG BUCKET

BUCYRUS-ERIE 1½-YARD Type "Y" Drag Bucket. Good condition. Located Kansas.
Box 1166-ME

DRAGLINE EQUIPMENT

72-ft. Dragline Boom and Fairlead—Hydraulic Equipment—1 Hoist Drum—1 Drag Drum—1 Boom Suspension, Sway Brace and Suspension Cables. All suitable for application to Bucyrus-Erie Model 75-B Machine. Located Eastern Pennsylvania. Box 1060-ME.

BARGAIN—NEW DIESEL COMPRESSOR ATLAS DIESEL POWERED portable air compressor, 4 cylinder, 60 H.P. engine of dustproof type, skid mounted, self contained, complete with radiator cooling system. Direct connected to a 320 cubic feet Worthington Feather Valve Compressor. Brand new and a bargain to the first comer. Atlas Imperial Diesel Engine Company, Oakland, Calif.

PARTS—175-B Shovel—PARTS

1 Boom
1 Dipper Shaft
1 Six Yard Dipper

If interested in making a good buy on these shovel parts, write us.
Box 607-ME.

THREE JORDAN SPREADERS, all in excellent working condition. Two of these machines located near the Twin Cities and other near St. Louis. All available for immediate shipment and priced to sell. Box 1008-ME

HAISS EXCAVATOR — C7097. June 1930. Weight 11 tons. Needs new teeth. 33" per minute crowding. Price $1800. Box 990-ME.

If You Do Not Find What You Want Listed—Write Us

EXCAVATING

South Milwaukee, Wis.

SHOVEL EQUIPMENT—Late design—suitable for Bucyrus-Erie 52-B Diesel. Only handled about 4,000 yards material. Equipment located Alabama. Box 1113-ME

TUNNEL EQUIPMENT

2 Type 20 Conway Mucking Machines.
5 I-R L-74 Water Liners.
24" Gauge Track, switches and dump cars.
16" Blower and Ventube.
Air Compressors, pipe line, etc.
All priced very reasonably.

Southern-Arsenal Public Relief Sewer Project of Fruin-Colnon Contracting Co., Foot of President Street, St. Louis, Missouri.

SHOVEL FRONT ENDS

1½ CU. YD. shovel front end—new dipper—for Marion 32 steamer. Priced right. Located near Chicago. Box 857-ME.

THREE-QUARTER YARD CLASS "C" Page dragline bucket, 45' boom with gantry and tagline weight, swing type fairlead. Adaptable to Northwest 104-105. Located Crystal Falls, Michigan. Box 1170-ME

INDUSTRIAL STEAM WRECKING DERRICK. Non-propel. Rating 50 tons at 20' with outriggers. Located Nebraska. Box 1171-ME

BUCYRUS-ERIE—4½-YD. 4-wheel scraper. Practically new. Located Central Illinois.
Box 1177-ME

BARBER-GREENE—MODEL B-44 ditcher. Located North Carolina. Box 1180-ME

KOEHRING DRAG SHOVEL equipment for Model 301 machine. Used very little. Low price. Located Eastern New York State.
Box 1181-ME

60 ACRES OF STRIP COAL LAND for sale. Average overburden 18 feet; 22 inches of No. 2 Coal. Located 30 miles East of Quincy, Ill., on State Route No. 104.
K. Layne, Baylis, Ill.

EUCLID-TUWAY 11-CU. YD. dump wagon. Hydraulic hoist. Worked only 320 hours. Located Central New York State. Box 1189-ME.

ERIE AGGREMETER BIN—80-ton capacity with 3 compartments, including weighing scales. Only handled 10,000 tons. Located Central New York State. Box 1190-ME.

FOR SALE: Rotary Screen. Climax 2½ jaw crusher. 1¼ clamshell bucket. 15 H. H. 3 phase motor. Stubner concrete bucket. Byers Bearcat, all attachments. 4" centrifugal pump. 2 elevator pulleys. Fine reduction Gyratory crusher. Small portable sand and gravel plant. Box 594, Warren, Pa.

MINING AND QUARRY EQUIPMENT

The following equipment is located in Minnesota. Full details on request.

3—Boilers.
12—36" gauge Koppel double truck flat cars.
6—36" gauge Peteler 4-yard two way dump cars.
4—Swing & Boom engines for Marion 31 & 36 shovels.
1—Austin-Western grader, 8' blade and scarifier.
4—Hoists—Single and double drum.
2—Milwaukee gasoline locomotives, 7-ton 24" gauge.
3—Electric motors, 100 to 150 h.p.
8—Pumps—Steam and gasoline.
1—Special Twin City Tractor.
1—Complete Ainley Placer gold machine.

Box 833-ME.

CONCRETE VIBRATOR
with grinding attachment.

MASTER VIBRATOR, powered with a 3 h.p. Wisconsin engine and equipped with 20' of hose and grinding attachment. Practically new, used on less than 200 cubic yards of concrete. Will take $450 for entire outfit, f.o.b. Mobile, Ala. Here is a pick-up for someone at this price. Box 1125-ME

USED EQUIPMENT FOR SALE

1—50-B Bucyrus Steam Shovel, Caterpillar
1—American Locomotive Crane, mounted on 4 wheels
Pile Driver attachment and Drag Line
66 ft. Leads
5 ton Steam Hammer (No. 1 Warrington Vulcan Steam with standard base)
Two pieces of cast slab ballast
1—15-ton Plymouth Gasoline Locomotive
1—7-ton Plymouth Narrow Gauge gasoline locomotive
1—3½-ton Plymouth Narrow Gauge gasoline locomotive
1—2-yd. clamshell bucket for handling materials
1—¾-yd. Page dragline bucket
1—¾-yd. Owen clamshell bucket
1—½-yd. Owen clamshell digging bucket
1—No. 8 Adams leaning wheel grader
1—No. 30 Caterpillar gasoline tractor.
1—No. 28E Rex Paver
1—No. 21E Rex Paver
1—7S Lakewood Mixer
1—Butler Bin with automatic weighing hopper, 36 cu. yds.
1—2" Triplex Domestic road pump
1—Band Saw Table
1—Saw table
Other Miscellaneous Small Tools and Equipment.

WILLIAM E. LENNANE
8717 Arcadia Avenue Detroit, Mich.

WANTED

WANTED: Shovel front-end for 301 Koehring. Must be usable equipment. Box 1185-ME.

WANTED, to Buy: Used full-revolving ½-cubic yard P&H shovel No. 150. Give location, price and terms in first letter. Box 1186-ME.

WANTED, to buy: Reduction crusher, 30 ton hour, minus one inch. Box 594, Warren, Pa.

EXCAVATING Bargain Counter

EVERY item on this page is priced for QUICK SALE. The equipment offered includes SURPLUS STOCK, REBUILT (carrying new equipment guarantee), and USED. Write or wire EXCAVATING, mentioning reference number. SAVE by filling your requirements from the BARGAIN COUNTER.

COMPLETE FRONT END EQUIPMENT

BOOMS

*18' 20-B steam shovel. New.	JA-2.
18' 31-B steam shovel. New.	JA-3.
20'0" 1030 chain crowd. New.	JA-24.
*20'6" 20-B steam shovel. New.	JA-4.
21'6" 37-B chain crowd. New.	JA-26.
21'9" 31-B steam shovel. New.	JA-5.
*28' 20-B diesel, gas or electric shovel. New.	JA-7.
23'6" 37-B rope crowd. New.	JA-28.
24'0" GA-2 drag shovel. Used.	JA-34.
*24' 43-B rope crowd. New.	JA-9.
*26' D-2 shovel boom. New.	JA-13.
26' 50-B steam shovel. New.	JA-15.
*27' 43-B rope crowd. New.	JA-16.
27'0" 43-B rope crowd. New.	JA-31.
*30' 50-B steam shovel. New.	JA-18.
40' 20-B, 31-B and D-2 dragline boom. Used.	JA-20.
26'0" Boom.	JA-36.
22'0" 43-B Boom.	JA-39
28'0" 70-T and 70-C Boom.	JA-40.
31'0" 52-B Boom.	JA-41.
35'0" 16-B Dragline Boom.	JA-42.
16'6" 16-B Boom.	JA-38.
35'6" 50-B High Lift Boom.	JA-43.
150'0" Class 230 Boom.	JA-44.
22'0" Chain Crowd Boom—43-B	JA-45.

DIPPER HANDLES

12'0" 18-B—Complete. New.	H-7.
12'6" D-2, 31-B—Complete. New.	H-8.
19'6" 43-B—Complete. New.	H-25.
*8'6" 1030 D/S Dipper Handles.	H-26.
18'6" 65-T and 70-T Dipper Handle.	H-27.
28'0" 80-B Dipper Handle.	H-28.
46'0" 200-B Dipper Handle.	H-29.

Asterisk (*) denotes more than one such item available.

DIPPERS

SMALL MACHINES

⅝ yd. Plate front, 20-B. New.	D-12.
⅔ yd. Plate front, 14-B. New.	D-13.
1 yd. Plate front, 20-B. New.	D-42.
*1¼ yd. Ins. tooth, 30-B, 41-B, 12-B, E-2. New.	D-44.
1¼ yd. Rock type, 30-B, 41-B, 12-B, E-2. Used.	D-27.
2 yd. 50-B dipper.	D-69.
½ Cu. Yd. 1020 Dipper.	D-76.
*⅔ Cu. Yd. 16-B Dippers.	D-70.
⅝ Cu. Yd. 21-B Dipper.	D-71.
*⅞ Cu. Yd. 32-B Dippers.	D-72.
*1¼ Cu. Yd. 34-B Dippers.	D-73.
*1½ Cu. Yd. 34-B Dippers.	D-74.
*2¼ Cu. Yd. 52-B Dippers.	D-75.
*1½ UE Dippers—37-B, 42-B, 43-B	D-55.
3 Yd. Dipper, used—100-B	D-77.

LARGE MACHINES

3½ yd. 2¾" front, two part teeth, 88-C, 95-C, class 80 Atlantic. New.	D-3.
6 yd. Two part teeth, 200-B, 225-B and 320-B. New.	D-11.
8 yd. Two part teeth, 320-B. Used.	D-6.

BUCKETS

DRAGLINE

*1 yd. Beco "U". 2000 lbs. New.	DB-34.
1¾ yd. Beco "U". 3250 lbs. New.	DB-35.
2 yd. Page "C". 5630 lbs. New.	DB-4.
*2 yd. Beco Heavy. 5400 lbs. New.	DB-24.
6 yd. Monighan "W". 12500 lbs. New.	DB-17.
7 yd. Monighan "W". 13700 lbs. New.	DB-18.
2¼ yd. Beco "U", 4,100 lbs. New.	DB-19.

Asterisk (*) denotes more than one such item available.

Help Wanted

MASTER MECHANIC

Fully experienced man wanted, familiar with Gas or Diesel engines, on tractors and shovels. Only sober and dependable men with good references need apply. E. A. Reynolds Cons't. Co. Inc., Fitchburg, Mass.

CLAMSHELL

2 yd. PF Williams clamshell bucket without teeth and counterweight.	CSB-1.

DIPPER TRIPS

31-B steam dipper trip. New.	DT-2.

ELECTRICAL EQUIPMENT

90 H.P. motor, G.E., 3 phase, 25 cycle, 550 volt, 1500 R.P.M. New.	EE-1.

BOILERS

44"x17', 75 H.P. locomotive, 125 lb. working pressure. A.S.M.E. std. Will fit 68-C.	B-13.

AIR COMPRESSORS

Brand new Worthington-Metalweld—2-cylinder 7"x6" vertical 162 cu. ft. air compressor.	AC-3.
*11"x11"x12" steam—locomotive type—Westinghouse. New.	AC-1.
11"x11"x12" steam—locomotive type—Westinghouse. Used.	AC-2.

Asterisk (*) denotes more than one such item available.

POSITIONS WANTED

Positions wanted advertisements will be run under this heading for 5 cents per word, minimum charge $1.00. Advertisements for help wanted free of charge.

Address all box numbers c/o EXCAVATING engineer . . . . . at South Milwaukee, Wisconsin

EXPERIENCED MASTER MECHANIC

Master Mechanic, 28 years of age, married, dependable, good education and habits. Fully experienced with gas and Diesel motors, crawler type tractors, all prominent makes of shovels and Euclid Trac-Truks. Capable of handling all equipment and maintenance crew. Can furnish good references. Willing to go anywhere.
Box 9104.

EXPERIENCED OPERATOR

Over 17 years' experience on Erie and Marion steam; Osgood gas; and Keystone excavators. Can do own repair work. Single; will go anywhere.
Box 8906

EXPERIENCED OPERATOR

Over 15 years' experience on Thew Diesel, steam and gas shovels and cranes; some experience on Eries, Byers and Limas. A-1 mechanic, will go anywhere.
Box 8905

EXPERIENCED OPERATOR

Experience covers 15 years as dragline, clamshell operator on Diesel and gasoline machines; levee, highway and canal work. Prefers work on Monighan or Northwest. Single, age 32. Can do own repair work and furnish reliable references. Will go to tropics; now located in Louisiana.
Box 8703

OPERATOR

25 years' experience on all makes of machines, gas, electric, Diesel, and steam. Has done dragline, shovel, crane, and clamshell work. Can do own repairs; furnish best references. Willing to go anywhere. Now located in Ohio. Box 8701.

EXPERIENCED OPERATOR

Operator with 10 years' experience on steam shovels wants position in Mich., Ind., Ohio or Ill. Age 29, married. Prefers quarry work on shovel, clamshell or crane, any size, make or type—steam, gas or Diesel. Can do own repair work and will furnish reliable references.
Box 9100.

STEAM SHOVEL OPERATOR

Over 20 years' experience on steam machines on all kinds of construction work. Desires position on any make, size or type steam shovel. Age 50, will go anywhere; now located in Missouri. Can do own repair work and furnish best of references.
Box 8802

OPERATOR

25 years' experience on shovel, dragline, crane and clamshell work. Can handle steam, gas or Diesel powered machines. Can do own repair work. Prefer Illinois, Indiana or Ohio, but will go anywhere on any kind of excavating.
Box 9001.

EXPERIENCED OPERATOR

Dragline operator, 12 years' experience on gasoline, Diesel and electric machines, large and small, 31 years of age. Desires position, either foreign or domestic. Can furnish character and performance references.
Box 9101.

SHOVEL OPERATOR

Six years' experience on Gas-Air and Thew-Lorain shovels, also about eight years on Erie, Marion and Bucyrus steam shovels. First class on grade and slope, sober and reliable. Age 43, single, willing to go anywhere. Can furnish good references. Located in Minnesota.
Box 9103

DECEMBER, 1937

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Atlas Imperial Diesel Engine Company 707
Austin-Western Road Machinery Company, The 677
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T-O-U-G-H

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This three-conductor cable is compact, flexible and tough. The non-porous rubber jacket is water proof and highly resistant to oils and acids. In addition, each individual conductor is effectively treated to prevent power leakage. Protect yourself from delays on the job by using Bucyrus-Erie power cable. Write for full information.

BUCYRUS ERIE

BUCYRUS-ERIE COMPANY

EXCAVATING, DRILLING & MATERIAL HANDLING EQUIPMENT-SOUTH MILWAUKEE, WIS., U.S.A.

938-C

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"Your men can reeve LAY-SET in place and get your machine back into profitable production in about half the time they would spend on non-preformed. Then, with LAY-SET, your machine will have much longer continuous operation—because LAY-SET will last longer.

"If LAY-SET Preformed wears out to the point where the crown wires part—they won't wicker out to jab workmen's hands. It's a safe rope to handle. It resists kinking; almost refuses to whip and spools on the drum perfectly. Being preformed it resists the fatigue of reverse bending. Believe me, sir (and we've been in business for 91 years) LAY-SET Preformed is a much better rope."

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ESTABLISHED 1846
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